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ANNUAL REPORT

OF THE

Board of Public Works,

TO THE

LEGISLATURE

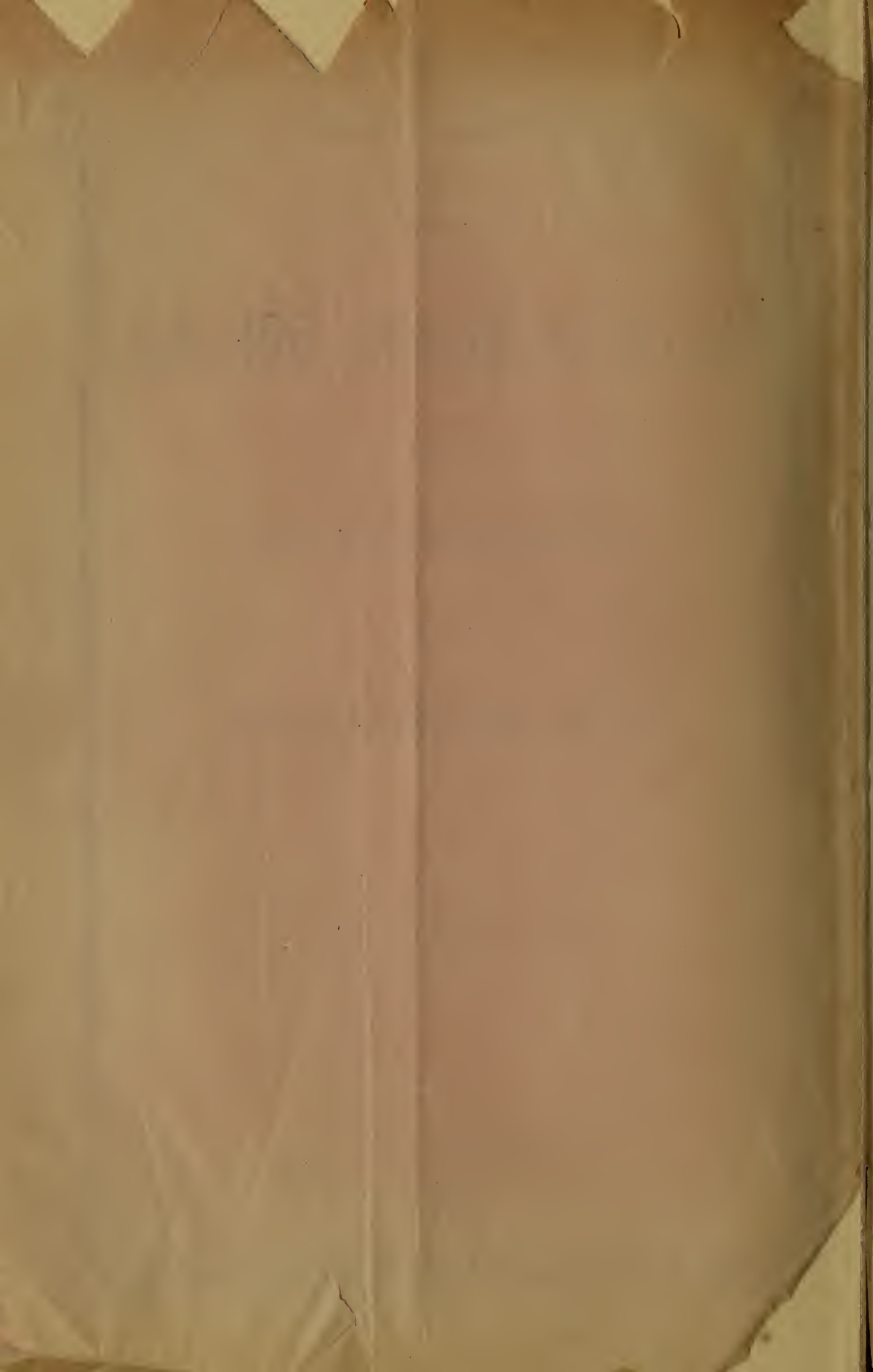
OF THE

STATE OF LOUISIANA.

JANUARY, 1861.

BATON ROUGE:

J. M. TAYLOR, STATE PRINTER.
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REPORT OF BOARD OF PUBLIC WORKS.

BOARD OF PUBLIC WORKS, Baton Rouge, January 19th, 1861.

*To the Hon. Senate and House of Representatives of the
State of Louisiana, in General Assembly convened:*

The Board of Public Works beg leave to submit the report of the Chief Engineer, which will be found to contain a full statement of all operations for the past year. Such works as the Legislature ordered at the last session, and those which were found in progress, have progressed as rapidly as the means placed at the disposal of the Board would allow.

Maps have been prepared of the swamp land belonging to the State, with a view of making surveys, upon which to predicate works for their reclamation. The amount appropriated by the last Legislature for surveys, traveling, etc., was so small that no progress could be made in such works.

The Internal Improvement Department requires the early attention of the Legislature. Either a re-organization, or an abolition of the Department would seem to be necessary.

In the Swamp Land Department the Board renews the recommendation of last year, to suspend the sale of swamp lands until they are improved.

Should the Legislature determine to prosecute the work contemplated in act No. 35, approved 23d February, 1860, which has been favorably reported upon by the Chief Engineer on page 76 of his report, in reference to surveys in the parish of Vermillion—an act appropriating the funds first appropriated by act No. 138, of 1858, will be necessary. The act of 1860 being construed by the Auditor as not authorizing him to pay moneys out of that appropriation.

The Board of Public Works finds it its duty, also, to report the non-payment of its warrant to Thos. Hunter, (contractor for improvements in progress in Bayou Pierre River) for work accomplished. The account current of the Board with that particular fund showing the balance paid Mr. Hunter, still in Treasury to its credit, while the Auditor construes act No. 214, of 1860, as not authorizing the payment of such balance. It is

therefore recommended to the Legislature to re-appropriate this balance, viz: \$9,000—to the credit of said work.

There will also be required an appropriation of five thousand two hundred and fifteen dollars and sixty-seven cents (\$5,215 67), for outstanding warrants drawn for expenses of the Internal Improvement Service.

And an appropriation also, for outstanding warrants, drawn for expenses of surveys ordered by the Legislature without appropriating the necessary funds. Three thousand six hundred and fourteen dollars and sixty-five cents (\$3,614 65).

All of which is respectfully submitted.

LOUIS G. DERUSSY, President,
F. M. KENT,
BRAXTON BRAGG,
G. W. MONTGOMERY.

By the Board.

P. H. THOMSON, Secretary.

ANNUAL REPORT

OF THE

CHIEF ENGINEER

OF THE

Board of Public Works,

FOR THE YEAR ENDING DECEMBER 31, 1860,

TO THE

LEGISLATURE OF THE STATE OF LOUISIANA.



BATON ROUGE:

J. M. TAYLOR, STATE PRINTER.

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REPORT.

ENGINEER'S OFFICE, BOARD OF PUBLIC WORKS, }
Baton Rouge, La., December 31st, 1860. }

To the Board of Public Works :

GENTLEMEN—In pursuance of the Board's instructions, directing me to make a consolidated report of the transactions of the Department for the current year, together with a fiscal statement exhibiting all appropriations and the expenditures made under them, I have the honor to respectfully submit the following :

INTERNAL IMPROVEMENT DEPARTMENT.

On assuming the charge of this Department on the 2d of January, 1860, as Chief Engineer to the Board of Public Works, the State force and boats were found to be distributed as follows :

Snag-boat Amite, Capt. J. Kinner in command, with thirteen State slaves, on the ways and undergoing extensive repairs to her hull, at Nugent's brick yard on the Amite River.

Snag-boat Algerine, Capt. A. M. Perrault in command, with two depot and sixteen State slaves, lying at the wharf in Baton Rouge.

Snag-boat Atchafalaya, Capt. A. Bradley in command, with twenty-one State slaves, lying at the wharf in Baton Rouge, with her shaft broken.

Snag and Dredge-boat Randall, F. Matthews, her engineer, in command with one depot and ten State slaves, laid up on Bayou Lafourche below Lockport.

Dredge-boat Harmanson, Capt. H. C. Walsh in command, with two depot and seven State slaves, laid up at the mouth of Old River.

Field-party, in charge of Capt. P. V. Landry, consisting of one depot and thirteen State slaves, working on the road from Kirk's Ferry on the Tensas River, to the hills on Sicily Island.

In addition to the foregoing force, there was one State slave at Baton Rouge, and one attached to the Avoyelles survey, besides one State and one depot slave turned over as runaways.

Total, 5 boats and 90 slaves, as follows :

On What Service.	State Slaves.	Depot Slaves.
Amite.	13	..
Algerine.	16	2
Atchafalaya.	21	..
Randall.	10	1
Harmanson.	7	2
Land force.	13	1
In Baton Rouge.	1	..
Attached to Avoyelles survey.	1	..
Runaway in 1857.	1	..
Runaway in 1859.	1
Total force.	83	7

On the 4th of January, the Randall and Harmanson were ordered to Baton Rouge for inspection and repairs.

Condition of the Boats.—Immediately upon the arrival of the Randall and Harmanson, I made a personal inspection of these five boats, and found them to be in reality a disgrace to the State of Louisiana. The entire fleet consisted of old, rotten and leaky hulls, mounted generally with worn-out and broken down engines and machinery, and furnished with old tackle and appliances miserably adapted to the purposes of snagging and dredging.

These boats had been constructed for the most part, from the odds and ends of machinery which had accumulated upon the hands of the Department, or which had been taken from the wrecks of old boats that had been worn out and gone down in the service. The necessity of using such material, was forced upon the several State Engineers, by the parsimony of the appropriations made for the service of the Internal Improvement Department. True economy would have rejected the use of such material, and dictated the introduction of new and improved machinery in the construction of every new boat.

All of the boats stood in need of extensive repairs to their hulls and machinery, before they were fit for active operations. The Atchafalaya and Amite were not worth the cost of repairing them, and the Harmanson was past all repair. The machinery and engines of the Randall were very good, but her hull had been badly constructed of green timber and was rotten and leaky. Besides this boat was unsuitable in every respect to serve the double capacity of a snag and dredge-boat at the same time, and her hull was considerably hogged in the centre by the double strain of the snagging crane upon her bows, and the dredging crane upon her stern. In consequence her dredging machinery was removed, and she was simply converted into a snag-boat.

DISPOSITION MADE OF THE BOATS AND FORCE.

Harmanson.—A Board of Survey was ordered upon the dredge-boat Harmanson, and she was condemned in toto, on account of the wretched

condition of her hull and machinery generally, and recommended to be sold. Accordingly, under instructions from the Board, she was sold at public auction on the 1st of February, after due advertisement; the proceeds of the sale being deposited in Bank to the credit of the Board.

Algerine and Atchafalaya.—On the completion of their repairs, the *Algerine*, in command of Capt. J. D. Rainey, with three depot and eighteen State slaves, and the *Atchafalaya*, in command of Capt. A. Bradley, with one depot and twenty-one State slaves, were ordered on the 29th of January to repair to Bayou Sorrel, with instructions to co-operate in the removal of the rafts which had accumulated in that stream. Twelve miles of continuous raft was removed from this bayou. These boats then proceeded to remove the rafts in Lake Chicot from its head down to the mouths of the Bayous Pigeon, and to break and pass out the raft from these bayous as far up as their junction with Grand River.

Before the navigation of these bayous will be really good, a number of snags, sunken logs and side raft must still be removed from their channels. All of the streams, in the whole of this section of the State, are more or less choked up with rafts to the detriment of navigation and the inundation of the surrounding country. In fact, Grand Lake, Lake Chicot, the Pigeons, the Tensas, Bayou Sorrel, Sorrel Bay and Grand River, have been the recipients for ages of their own and the Mississippi drift. Not only has this section of the country been glutted by the large quantities annually coming in from Bayou Plaquemine, but also by the accumulations which formerly came in from the Mississippi through the *Atchafalaya* River. For some considerable period after the original meeting of the Red and Mississippi Rivers, the *Atchafalaya* necessarily became the receptacle of a large portion of the Mississippi drift, from its manner of leaving the latter in the sharp loop of Old River, and this state of affairs continued until the final and complete rafting of the *Atchafalaya* itself, from Berwick's Bay to its head in Old River.

After opening the Pigeons, the operations of these two boats were made separate. The *Atchafalaya* worked in Lower Grand River and in Bayou Go-to-hell, in order to complete the circuit of navigation from Belle River through the Pigeons, etc.; to Grand Lake. She then proceeded to Bayou des Glaisses and removed the overhanging trees and rafts from this bayou up to its junction with the Alabama; she also removed the obstructions from this latter bayou. Subsequently she worked upon Bayou Courtableau, deadening the trees, upon its banks, and removing the leaning ones which impeded navigation, very nearly as high up as Washington, when the boat was ordered to Baton Rouge, where she arrived on the 29th of May. There was great difficulty at times to keep the boat afloat.

The *Algerine* continued to work in Lake Chicot, and in passing the raft out into Grand Lake. She also worked on Lower Grand River, and in

finishing the work in Bayou Sorrel and Sorrel Bay, removing the rafts, fallen timber and overhanging trees therefrom, until her recall to Baton Rouge about the last of May.

Randall.—On the completion of her repairs, February 27th, the *Randall*, in command of Capt. J. T. Hanlon, with two depot and fifteen State slaves, was dispatched to Bayou Mason. Unfortunately she broke her wheel-shaft when twelve miles up Red River, so that the boat was compelled to return to Baton Rouge for repairs. Here is an illustration of the weak character of the machinery of all of these boats and their constant liability to breakage. Designed for heavy strains in their everyday operations of snagging and dredging, their light cast iron shafts, as in this instance, are apt to break, even in ordinary locomotion in smooth water. After repairing damages, the *Randall* again started for Bayou Mason, and commenced operations in that stream on the 7th of April. The rafts, snags and fallen timber were removed from this bayou for a distance of ninety-five miles above its junction with the Tensas, to which river the boat was then obliged to return, owing to the rapid falling of the waters in the Mason. A portion of her crew was detached to assist P. V. Landry in completing the Kirk's Ferry road, after which the boat returned to Baton Rouge, bringing with her this land force and its equipments.

Amite.—Although an increased force was placed upon the *Amite*, the absolute repairs required upon her were not completed until the 10th of April. She was then directed to work in the *Amite* River and Bayou Manchac, in command of Capt. H. C. Walsh, with a crew of thirteen State slaves. All of the snags and sunken logs obstructing the navigation of the *Amite*, from Nugent's brick yard, where she had undergone her repairs, as far down as obstructions were found in this river, were removed. Some of the most dangerous snags and sunken logs, were also removed from Bayou Manchac. Owing to the sale of the slaves, this boat was laid up in the *Amite* River on the 29th of May, and her crew were brought into Baton Rouge. An agent was placed on board, to protect the public property, and keep the boat afloat.

Land Force.—The force upon the Kirk's Ferry Road was continued in charge of Capt. P. V. Landry, as it was found organized, consisting of one depot and thirteen State slaves. By the assistance eventually received by this force from the *Randall*'s crew, it was enabled to complete this road from Kirk's Ferry on the Tensas River, to the hills on Sicily Island, with all the necessary bridges and culverts. This road is about six miles long, with ditches on each side of it throughout, leaving a road-way twenty-two feet wide, upon which the earth excavated from the ditches was thrown. About six hundred feet of the road was charcoaled. It is impossible to make anything of this but a good summer road, as it is subject to overflow from the high waters of the Tensas.

This closes the operations of the Internal Improvement Department up to the 29th of May, when they necessarily ceased in consequence of the sale of the slaves. Its effective services were greatly reduced and necessarily limited. First, on account of the length of time required to repair the boats before they could be put in working order ; and secondly, on account of the short period intervening thereafter, prior to the sale of the State slaves, agreeably to the provisions of act No. 235, of 1860. Besides, the prospect of this sale demoralized the slaves to a considerable extent, and many of them ran away in consequence. They were all returned, however, before the day of sale.

Sale of the Slaves.—At the request of His Excellency, Gov. Thos. O. Moore, all of the State slaves were dispatched upon the State boat Randall, on the evening of the 29th of May, to be sold at New Orleans in accordance with the provisions of the foregoing act, excepting eight, which were selected as a reserve force for the service, as provided for in the said act.

The services of all the captains were dispensed with at the same time, excepting those of Capt. J. D. Rainey, who was retained.

The following is the number of slaves turned over to the Auctioneer, for which receipts were obtained :

State slaves on hand at sale.....	73
Absent, and sold as runaway.....	1
Number reserved for State service.....	8
Died during the year.....	1
Total.....	83

Which agrees with the number received from L. Hebert, State Engineer. There were five other State slaves sold, who had been turned over to the Deaf and Dumb Asylum, agreeably to the provisions of act No. 181, of 1857.

DISPOSITION OF BOATS AND RESERVED FORCE.

On the return of the Randall to Baton Rouge, this boat and the Atchafalaya were laid up at the wharf in this place, as the Amite had been on the Amite River, and an agent was appointed in charge of each to keep them pumped out, and guard the public property on board.

The *Algerine* was kept in commission. On the 1st of June, therefore, the State force consisted of eight State and seven depot slaves, one boat in commission and three floating idly at their moorings for want of force to man them. These useless boats should all have been sold at the same time with the negroes ; as three of the small force available, had to be kept on board of the Randall and Atchafalaya to pump them out.

Algerine.—On the 1st of July, the *Algerine*, Capt. J. T. Hanlon in command, with seven State and five depot slaves, was sent to Old River with instructions to take certain soundings and measurements, preparatory to a

survey of that river with a view of improving its low-water navigation. This boat was used upon this survey, and subsequently in an examination of the Atchafalaya, Courtableau, Plaquemine, Lower Grand River, the Sorrel, the Tensas, the Pigeons, Lake Chicot and Grand Lake. She was then sent around by sea to operate in Bayous Barataria, Vilars and Signet, and to assist in the survey of the country lying between Bayou Lafourche and the Mississippi River. Although the crew of this boat was too small to snag sufficiently, she nevertheless succeeded in removing all of the obstructions to navigation from these three bayous. She was also used for a short time upon the survey mentioned.

Mouth of Old River.—Agreeably to the instructions of the Board, the Algerine was then sent to the mouth of Old River, to deepen the water over the bar if possible. This was attempted by using a harrow and attached scraper. The harrow alone, proved a failure in attempting to deepen the bars at the Passes of the Mississippi; but it was found to operate successfully there, when a scraper was attached to the rear of the harrow, and made to project about three inches below the teeth. Accordingly a scraper was attached to the harrow which had formerly been used upon the mouth of Old River, and a channel of the required width was marked out with spar buoys.

By using the snagging crane of the Algerine to lift and lower the harrow, and by working constantly in one direction through the marked channel, backing the boat in the operation in order to save the cost of an extra crane upon the stern of the boat, a partial success was obtained in deepening the bar.

The operation was materially assisted in this particular instance, by a rapid rise in both the Red and Mississippi Rivers. While the harrowing process was continued, the total depth gained upon the bar was three feet and six inches; of which, two feet three inches was due to the rise of the water, and only one foot and three inches to the harrow deepening the bottom. The Mississippi then commenced to rise rapidly, until it attained a total rise of six feet one inch, with an increased current setting in towards the mouth of the Red River. The total rise of the water in Old River was, at the same time, four feet and seven inches, while the soundings over the bar were seven feet and six inches.

I am perfectly satisfied in my own mind, that no process of dredging will ever prove efficacious in deepening the Old River bar, for any practicable purpose of navigation, during low stages of water, when alone it is required. My convictions are based upon the two following facts: First, during low stages of water the current of the Mississippi invariably sets in towards the mouth of Red River; and secondly, the bar is composed of such light and shifting material, that it sometimes drifts directly across the the mouth of Old River, while at other times it forms the obstruction to

navigation at some considerable distance out in the channel of the Mississippi. It is evident that the direction of the current would defeat all chance of success in the use of the harrow and scraper, as this process of dredging is entirely dependent upon the current of the channel, together with that generated by its own motion ; and in consequence we would be compelled to draw the material composing the bar into the mouth of Old River, instead of out into the Mississippi. This latter can only be done when the current of Old River sets into the Mississippi, and this is never the case in low water. It is equally evident, that the shifting character of the bar would prevent all success in the use of the ordinary spoon or bucket dredge, as the drifting material composing the bar would constantly fill the excavation as often as it was made.

Floating Boom.—Agreeably to the authority given me by the Board, the *Algerine* was next sent to the head of Bayou Plaquemine, to construct a floating boom to prevent the flow of drift down that stream. The total length of the boom is four hundred and thirty-two feet. It is constructed in sections of twenty feet long, each section being composed of nine pieces 12 by 12 inch light pine timber, thoroughly bolted together, and connected with anchor chains as shown by the drawings on file in the office. The boom reaches from the bank of the Mississippi nearly across the head of the Plaquemine, in the direction of the river currents, and is securely held in position by a series of ship anchors. The boat was also ordered to remain at the head of the Plaquemine, and to use her crew in assisting the boom to pass all the floating drift timber down the channel of the Mississippi.

I am satisfied that the arrangements made will prove eminently successful, and that this simple work, at an inconsiderable cost, will save thousands of dollars to the State in the subsequent removal of this drift, besides keeping open the navigation of the bayou, and preventing the serious inundation of the country below, occasioned annually by its accumulation in the outlets of Grand and Atchafalaya Rivers.

Atchafalaya and Randall.—During the violent storm on the 2d of October, the *Atchafalaya* sank at her moorings at the bank in Baton Rouge, and in accordance with the Board's instructions, she was sold at public auction, after due advertisement, the proceeds of which sale were deposited in Bank, to the credit of the Board of Public Works.

The temporary use of the *Randall* was given to the Grosse Tete Railroad Company, to assist in getting off their boat from the shore opposite this place, where she had been driven in the storm before referred to. This boat also sank at the bank where she was moored, on the morning of the 16th of October, while in the act of getting up steam to operate for the day. In fact, none of these boats were ever fit for the service required of them by the State. They are in constant need of repairs, and there is a continual breakage whenever they are used. The engines, boilers and shafts of

the Randall, and such other portions of her machinery as could be saved, were recovered from the wreck and properly stored.

GENERAL REMARKS.

There is perhaps no Department of the State Government which has accomplished so much, with such insufficient means, as the Internal Improvement Department, when the extent and variety of its operations are candidly taken into consideration, together with the fact that it has been crippled more or less by inadequate appropriations, and rendered inefficient by unsuitable and weak machinery and force, ever since its inauguration under the old Board of Public Works in 1833. The appropriations have rarely equaled the amounts estimated for the current expenses of the year, and estimates for the construction of new boats to be equipped with proper machinery, have generally been disregarded.

To be rendered effective, this Department should be amply supplied with substantial boats furnished with modern improvements in machinery, instead of being forced to continue the use of the effete productions of a past age. The number of hands should also be proportioned to the amount of work required.

The principal duty of this Department has heretofore been, to free the navigable streams of the State of all the natural obstructions which impede their navigation, and thus furnish easy water communication, to the trade, commerce and travel of every section of the State. No territory in the world is better traversed with navigable water-courses in all directions, providing so many natural facilities for internal intercourse, than the State of Louisiana. Besides, the greater part of the productive wealth of the State is located directly upon the rich banks of these streams. Many of these water-courses, however, are still in a state of nature. Beds of sunken logs buried in the sand at the bottom, are among the worst of the obstructions, and here the channel becomes almost impassable in low water. Fallen timber, snags, rafts and overhanging trees, are the other common obstructions to their successful navigation.

Now, it certainly seems reasonable to suppose, that this extensive network of rivers and bayous, with such assistance as a well-organized Department could give them, would afford better and greater natural facilities for internal intercourse, than any artificial method which could be devised. And yet, if the State force is not soon recruited and provided with proper boats and tools to work with, many of these streams will become choked up completely with fallen timber and drift, destroying their navigation entirely, and making their sections dependent upon land transportation, or upon the future construction of railroads, for their supplies and the conveyance of their products to market. Railroads can only run upon certain favorable lines, still leaving large portions of the country on both sides of

these lines, dependent upon other means of transportation. Although invaluable in themselves, and enriching the country through which they pass by enhancing the value of lands and property, still railroads can never compete with the natural water communications of the State, in the economical transportation of the supplies and the heavy agricultural products of the country.

Louisiana is eminently an Agricultural State. She will never be distinguished as a manufacturing country to any great degree. The main source of her present and future prosperity, is almost entirely dependent upon the great productive wealth of her rich alluvial lands. These lands are located, for the most part, directly upon her innumerable rivers and bayous. Owing to their natural condition, however, these streams generally are not navigable; so that the great and absolute necessity of the agricultural districts, is a cheap and easy conveyance of the natural products of the country to the best market. It would seem, therefore, that a sound legislative policy would certainly dictate the immediate improvement of our natural streams, in order to facilitate this internal intercourse in every direction, and provide the necessary water transportation.

Nearly all of the other States have been more or less taxed for the purposes of Internal Improvement. Heretofore, Louisiana has only avoided such taxation, because she possessed a fund arising from the sales of certain lands, which sufficed for her early requirements. Because this fund is now exhausted, or nearly so, it does not follow that the internal improvements of the State are to be abandoned for the reason that taxation is odious. The growing necessity for economical transportation to an agricultural population, which is constantly increasing, will eventually force us to resort to taxation to procure means for the purpose. Then why not levy a small one at once, when it is so evident that much will be gained by early operations?

There is no hesitation in taxing the State, and in making large appropriations to assist in building railroads, at an average cost, when fully equipped, of about twenty-four thousand dollars per mile. A tithe of the tax so levied for railroads, would thoroughly open out all of our navigable water-courses, which would prove a desideratum of vastly more benefit to the general interests of the State, than all the railroads that will ever be constructed within her limits. This is not offered as an argument against railroads *per se*, but because these public works are fostered to the prejudice and complete sacrifice of a more important interest.

In connection, furthermore, it must not be forgotten that the streams of the State constitute its natural drainage; and that the removal of all obstructions from their channels, goes hand in hand with the reclamation of the adjacent country. To reclaim thoroughly, we must begin at the outlets and work upwards, and not by partial and isolated works in the

middle, or at the end of our general plan. Every raft dislodged and removed, increases the vent for the more rapid passage of the floods. Hence the drainage is facilitated, and the water is prevented from backing up as a consequence of the accumulation of raft. This, of course, reduces the dimensions of the levees required in the neighborhood of the streams.

The lake formation along the courses of many of the streams of the State, had its origin in no other cause than the formation of rafts in the channel, which dammed the water, and hence backed it over the surrounding country. On the removal of such rafts, the lakes are drained and the water is discharged naturally within the channel of the stream. Now, the chief functions of the Internal Improvement Department, consist almost entirely in the complete removal of all such obstructions, without which, all ordinary methods of reclamation and drainage will prove futile. We may, therefore, briefly sum up the benefits to be derived by the State from such a Department, properly organized and efficiently administered, to be as follows :

1st—Open communications in every direction, and economical transportation to the commerce and natural products of the country, through all of the navigable rivers and bayous of the State.

2d—The reclamation of the swamp and overflowed lands of the State, by opening the main drainage arteries and their natural outlets, thus facilitating the sub-drainage and reducing the height of the levees.

THE CONTRACT SYSTEM.

It has been, and is still urged, that by letting the work out by contract, obstructions can be removed more economically and efficiently from all of the streams of the State, than by means of State boats and force in constant employ, as has been adopted hitherto. Let us examine and see if this is really the case.

In the first place, how are the estimates to be made of a rafted stream, on which to base contracts, so that the State will not be imposed upon on the one hand, and so that the contractor will not be obliged to abandon his work from personal loss, on the other? Can such an estimate be made of the Plaquemine, or the Sorrel for instance, when they become rafted? Or how could the compensation for extra work be adjusted fairly, when the drift is coming down as fast as it is removed, and when, nevertheless, the necessities of the case require the contractor to keep working on? It frequently happens, even in ordinary cases, that when one snag is removed, others spring up to replace it, and these again are followed by the uprising of sunken timber, the existence of which was not before suspected. It is plain, therefore, that it is utterly impossible to make an equitable contract, that will be just at the same time to both the State and to the contractors.

Contractors, as a class, invariably shirk their work and slide over

difficulties when they find that their contract does not prove remunerative. A State force can be influenced by no such motive, and can have no possible object in not thoroughly performing their work. Besides, under what were considered just contracts, as much as \$2,500 per mile was paid by the late Board of Swamp Land Commissioners, for removing the obstructions from certain streams. Now, Bayou Sorrel was cleaned of twelve miles of continuous raft, the greater portion of which was passed out into Lake Chicot, and thence into Grand Lake. It is fair to suppose that this work, if let out by contract, was worth per mile the compensation before mentioned. Under the contract system, therefore, the cleaning out of twelve miles of Bayou Sorrel, would have cost the State \$30,000, a sum exceeding the amount appropriated to defray the current expenses of the whole Internal Improvement Department for an entire year. Now this Department, even for the few months it operated under the Board, performed more than four times the amount of work done on the Sorrel; which, if remunerated at the same prices, would amount to a sum that would contribute largely towards reorganizing the service and placing it upon a proper footing.

Comparative Cost of White and Slave Labor.—It is furthermore urged, that with the boats and appliances belonging to the State in both cases, white hired labor is more economical, than that of a negro force belonging to the State. To begin with, this is certainly a singular argument to be urged in a slave State. But, nevertheless, let us examine the relative cost of these two systems.

Everything being purchased, and nothing raised, the annual cost of each negro in the State service, exceeds that of an ordinary plantation hand. Allowing this yearly expense even to be greater than what it has been determined to be, by the experience of the late State Engineer's Department, besides eight per cent. interest on the capital stock, together with four per cent. on same for annual loss, we will have as the cost of one hundred negroes, per year, as follows :

Value of 100 negroes at \$1,400 each.....	\$140,000 00
Interest on same per year at 8 per cent.....	\$ 11,200 00
Loss on stock for one year at 4 per cent.....	5,600 00
Provisions and clothing at \$100 per head.....	10,000 00
<hr/>	
Total annual expense of 100 negroes.....	\$ 26,800 00
Placing the rate of white labor at \$35 per month, including board, which is a very moderate estimate, and we have the total annual cost of 100 white men.....	\$ 42,000 00
Expense of 100 negroes as above.....	26,800 00
<hr/>	
Difference in favor of slave labor per year.....	15,200 00

Even admitting that the white laborer can perform as much hard service in this climate as the negro, still he is more difficult to control, and is apt to

demand higher wages, or leave you, at the very times that you most require his services. This same argument was offered in favor of the slave system by G. W. Morse, State Engineer, in his Annual Report of 1855. The comparison, in point of economy between the two, is certainly not in favor of the system of white hired labor over that of the negro labor late in use.

It is idle, however, to attempt to reorganize this Department unless it is done thoroughly. As necessity compelled it to be administered before the State slaves were sold to pay its outstanding debts, the Internal Improvement Department was forced to trifle away the small sums annually appropriated in making certain streams passable for the time, when a larger appropriation and a more effective force would have made the improvement permanent. Furthermore, the work cut out for it by each successive Legislature was wholly disproportioned to its ability. Because it could not perform impossibilities, complaints arose against it from different quarters, and the Department fell into disrepute. The fault lies in the inadequacy of the means placed at its disposal, not in the system itself.

In truth, but little encouragement has hitherto been given to the State Engineers to induce them to make of this Department the vigorous and efficient service it should have been. The position of State Engineer has always been a thankless office, wherein zeal has been paralyzed, professional skill frustrated, and wherein no amount of scientific ability or personal ambition has been able to secure a reputation.

The appropriations even for the current annual expenses of this Department have generally been made so sparingly as not to suffice for its common maintenance. Debts were contracted in consequence, which had to be liquidated out of the next subsequent appropriation, the service being carried on for the balance of the year upon the personal credit of the Engineer. In consequence of these facts I found, upon taking charge under the Board, that the honor and credit of the State had fallen to that degree that many of its former creditors would not deal with the Department unless payments were made in cash. To meet these it became necessary to borrow money, as there was not sufficient in the Treasury to meet the wants of the service, and no adequate provision therefor had been made by the Legislature. In consequence, the credit system has continued to prevail, as heretofore, throughout the current year, the advance which was made to the Board remaining still unpaid.

One of two things is evident—either to reorganize the Internal Improvement Department thoroughly, and place it upon a respectable financial footing, or otherwise to liquidate its debts and then abolish the whole system altogether.

REORGANIZATION.

The best interests of the State demand a complete and immediate reorganization of this Department. It is folly to continue the old system through

another year. To open the new year without credit and in arrearages for old debts, with two old boats totally unfit for the service in every particular, and which would only prove a source of constant expense, is a state of affairs which certainly does not give much earnest of future usefulness or efficiency. Trusting, however, that the subject may meet with the attention which its importance demands, I would respectfully recommend that the Internal Improvement Department be reorganized upon the following basis, and that the Board strenuously urge upon the Legislature of the State the pressing necessity of providing the means required to carry the same into execution :

There are now eight slaves in the service, and this force should be increased to one hundred by the purchase of ninety-two more hands. The law requiring all runaway negroes lodged in the several parish jails to be subsequently sent to the State Depot at Baton Rouge, agreeably to certain of its provisions, should also be duly enforced, as the State force would be largely increased by a proper execution of this law. Several instances have occurred under my own observation wherein the law was not complied with, and by which non-compliance the State has lost the services of these negroes as custodian of the same for their masters unknown.

Three substantial snag-boats, with improved tackle and machinery, are absolutely required—one for service in the Florida parishes, and two for the rest of the State. One good dredge boat to remove and deepen bars, and which can also be used in cutting canals throughout the State. One dispatch and survey boat.

The cost of reorganizing upon this basis, and the consequent appropriation required for the maintenance of this force for the next fiscal year, and for the current expenses of the Department, is as follows :

ESTIMATE OF NEGROES AND BOATS REQUIRED.

Ninety-two slaves at \$1,500 each.....	\$ 138,000
Three snag-boats, each one hundred and thirty feet long, with improved snagging crane, drums on shafts, steam stoppers and capstans, together with engine, doctor and machinery complete, each at \$15,000.....	45,000
One dredge boat seventy-five feet long, thirty feet beam, and five feet deep, without motive power, and with engines, boilers, dredging crane and machinery complete.....	16,500
Dispatch and survey boat one hundred feet long, and with twenty feet beam, not to draw more than thirty inches of water, suitable for river or bay transportation, and fitted with cabin, etc., complete.....	9,000
Total appropriation required for purchases.....	\$ 208,500

*Estimate of Current Expenses for the Year Ending December 31st, 1861,
Upon the Above Basis.*

Hardware, rope, chains, tackle, tools, etc.....	\$ 5,000
Wood (to save cost of time in cutting same).....	3,000
Medicines and medical attendance, clothing and provisions for 100 negroes, with supplies for Captains of boats.....	10,000
Contingencies for special works, etc.....	3,000

Total appropriation for current expenses.....\$ 21,000

RECAPITULATION.

Total required for purchases.....	\$ 208,500
Total required for current expenses.....	21,000

Aggregate appropriation required for thorough reorganization.....\$ 229,500

If it is deemed advisable, a portion of the negroes only might be purchased during the first year, when two snag-boats and the dispatch boat alone would suffice for the reduced service. The complement of negroes, and the other boats recommended, could be added to the Department in the next following year.

If a reorganization upon this basis is not adopted, I would earnestly recommend an entire abolition of the whole system of Internal Improvements as heretofore conducted. In view of such a course, I would furthermore recommend that the present State force of eight negroes be retained as a labor corps, to assist in the various surveys ordered by the Legislature in the different sections of the State.

It is also highly important, as a question of economy as well as to secure dispatch and efficiency, that the survey boat heretofore recommended in this report should be constructed for the reduced service, for the transportation of parties to the field and for river surveys. A portion of the slave force could act as her crew. Such a boat will more than pay for herself in two years.

In view of the adoption of this recommendation, the following estimate is submitted :

Cost of dispatch and survey boat complete.....	\$ 9,000 00
Provisions, clothing, medical attendance, etc.....	1,500 00
Wood.....	500 00
Hardware, rope, tools, etc.....	300 00
Contingencies.....	700 00

Total appropriation required.....\$ 12,000 00

STATEMENT OF FUNDS.

Turned over by L. Hebert, State Engineer, from sales of old iron..	\$ 100 00
Sale of dredge boat Harmanson.....	1,994 25
Advanced by F. Huguet for service of Department.....	5,414 58
Sale of snag-boat Atchafalaya.....	125 00

Total deposited in Bank to credit of Board of Public Werks.....\$ 7,633 83

In Treasury, January 1st, 1860.....	\$ 1,568 30
Appropriated by act No. 245, of 1860.....	22,500 00
Total.....	\$ 24,068 30
Expended and warrants drawn upon Treasurer for same.....	\$ 21,632 00
Balance in Treasury.....	\$ 2,436 30

IMPROVEMENT OF THE LOW-WATER NAVIGATION OF OLD RIVER.

In pursuance of instructions from the Board of Public Works, I examined and made the necessary surveys of Old River, the mouth of the Red, and the head, or source of the Atchafalaya Rivers, together with such parts of those streams and their tributaries and of the adjacent country, as I considered involved in any way, in properly complying with the requirements of the following acts of 1859 and 1860, to-wit :

First. Act No. 262, of 1859, appropriates thirty-five thousand dollars "For the purpose of preserving the navigation of the Old River, between the mouth of the Red River and the Mississippi, and also to make such examinations and surveys as may be required to establish the works necessary to prevent a separation of the Red and Mississippi Rivers."

Second. Joint Resolution No. 29, of 1860, "Requires the Board of Public Works to examine and report to the Legislature as early as practicable, as to the utility and practicability, and the cost of constructing a levee or dam across Old River, through which Red River communicates with the Atchafalaya River, and to report upon the effects of this work upon the Mississippi River."

Third. Joint Resolution No. 30, of 1860, "Requires the Board to examine and report to the Legislature as early as practicable, as to the practicability and probable cost of partially closing the mouth of the Atchafalaya River on the Old River, so as to reduce the present width of the Atchafalaya to the width of sixty feet, or so much as is necessary not to obstruct navigation, and to report upon the effects that such dam will have upon the Mississippi River."

These acts are similar in their import, but differ materially in their extent and consequences.

The first proposes to effect a permanent improvement of the navigation of Old River, and thus continuously to keep open, through its channel, the communication of the Red River with the Mississippi.

The second, literally calls for the effects likely to be produced upon the Mississippi only, by the experiment of throwing a dam across Old River below the mouth of Red River.

And the third, proposes in a like manner, to determine the probable effects produced upon the Mississippi, by a partial closing of the head of the Atchafalaya.

The first act indicates plainly an important object; whereas the second and third, only invite speculation and theory, which will prove as little beneficial to the legislator, as to the Engineer.

It is obvious, however, that the main object of this and of previous legislation, has been, to solve the difficult problem of keeping permanently open the low-water navigation through Old River, as a common communication for both the Red and the Atchafalaya Rivers with the Mississippi. This is one of the most important problems, perhaps, which can be presented to the people of Louisiana; as it not only embraces the question of low-water navigation under discussion, but its successful solution, which can be accomplished in but one way alone, is also the key to a perfect system of reclamation and drainage for a large part of the State. Its physical difficulties, however, are of the highest order, and its solution involves so many elements, that a brief history of the causes and effects leading to the present embarrassed condition of things, is absolutely required in order to a clear understanding of the subject in hand.

ORIGIN AND CAUSES OF THE DETERIORATION OF THE NAVIGATION OF OLD RIVER.

I am unwilling to admit a mere speculation in this report, but in as far as the question of original unity between the Red and the Atchafalaya Rivers is concerned, this is unavoidable. History and tradition, at their remotest dates, found the same indirect separation of these rivers as there is at present; for, no direct evidence of a more perfect connection between them has ever come down to our times. Hence our deductions regarding this former unity, can now only be based upon a careful inspection of the present geography and geology of the valleys of the two rivers in question. A close examination and comparison of the physical aspects and the geological formations of these valleys, leads one inevitably to the conclusion, that there was a former time when the Red and Atchafalaya Rivers were one and the same stream, which had no connection with the Mississippi whatever, except through lateral overflows in extreme floods. It is not presumed by this, that there were not other outlets to Red River besides the Atchafalaya, during the outward progress of the whole front of its delta. The T  che, in all probability, was such an outlet up to a very recent period comparatively. But upon due investigation of the subject, however, the conviction will force itself upon every one, that, as the land extended outward, the Atchafalaya became the final and only remaining one of these outlets.

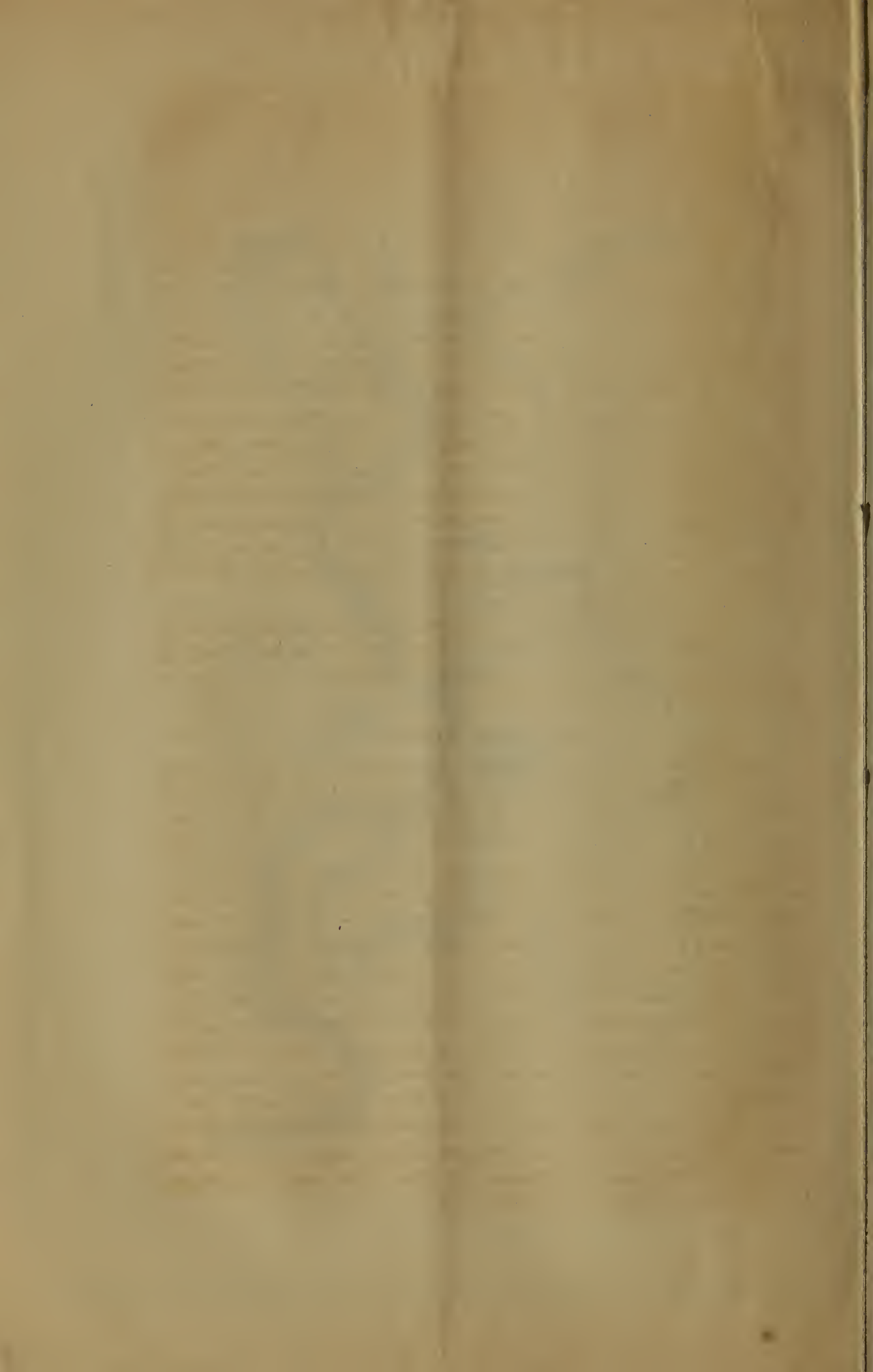
I am aware that this former unity between the Red and the Atchafalaya Rivers has been questioned by several able and scientific writers. The problem of low-water navigation, which remains to be solved, however,



Fig. 1.



Fig. II.



depends upon the present existence of things, and not upon the changes of the past ; and, therefore, it is immaterial whether this premise be admitted or not, as it will be fully proven hereafter that these two rivers form one and the same stream now, which will be sufficient for our argument. The Red and the Mississippi Rivers then occupied separate valleys, running generally parallel with each other, but with no immediate connection between them. The latter sought the Gulf at the Balize through its own independent channel, while the former reached the sea through the Atchafalaya and Berwick's Bay.

The general tendency of alluvial streams is ever to lengthen their courses and reduce their slopes. As a consequence of the tortuous meanderings resulting from this consideration, the Red and Mississippi Rivers came together and mingled their waters. In thus coming together, however, it must be borne steadily in mind, that the former was completely cut into two parts ; and that the bend or loop of the Mississippi, now called Old River, separated these parts by a distance of about three miles, and thus maintained an indirect communication only between them. For easy nomenclature we will designate these parts by the names by which they are now known ; that is, we will call the upper one Red River, and the lower the Atchafalaya.

The annexed diagram, (Fig. I.) illustrates the probable position of the Red and Mississippi Rivers, a short time previous to their meeting ; and (Fig. II.) their absolute condition subsequent to the making of Shreve's and the Raccourci Cut-offs.

EFFECTS OF THE MEETING.

The natural effects which would be produced by the meeting of the waters of the Red and Mississippi Rivers, would be as follows :

Effects upon the Atchafalaya.—As the Atchafalaya flowed directly from the apex of an abrupt bend of the Mississippi, which then, as now, constituted its source or head, it is evident that after the meeting mentioned, it would become the general recipient of most of the floating drift coming down the Mississippi during the rise of its floods. The inevitable result of this would be the complete rafting of the Atchafalaya from Berwick's Bay to its head. Everything proves this dense rafting to have taken place, traces of which are apparent throughout the entire course of the river, in its lake formation, and in its numerous lateral chutes, caused by the water breaking around the rafts and coming in again below them. This has been known to be the case up to a very recent date, as but a few years have elapsed since the rafts were broken and removed by the Internal Improvement Department. These obstructions would render the current of the Atchafalaya very sluggish, whence there would be a consequent rapid deposition of sediment upon the rafts, causing the channel of the river to contract and shoal its bed.

This co-relation between the transporting velocity of the channel of an alluvial stream, and the inertia and cohesion of the bottom and sides of its channel, are self-evident. If water be taken from the muddiest stream and allowed to become quiescent in a vessel, it at once precipitates the earthy matter in suspension and becomes pure and limpid, because this sediment had been lifted and carried along entirely by the velocity of the current, or the mechanical action of water in motion. We have similar results in all sedimentary streams, wherein the slightest check of the current will produce a corresponding deposit in the channel, immediately at the point where the current is checked.

The converse of this is equally true, that the water of an alluvial stream will be filled or saturated with earthy matter in suspension, directly in proportion to the increase of the velocity of its current. A mountain torrent, for instance, detaches large fragments of rocks and rounds them into pebbles by the force of its current alone. Such a current, in many of the streams of Louisiana, would carry away bodily large masses of earth. Besides, the fact is familiar to every one, that the water of the Mississippi is more free from sediment at its low stages, than it is during the increased velocity of its floods.

These universal hydro-dynamical laws are dwelt upon in this connection, because their effects are not sufficiently considered in constructing many of the works of the State, and because we will have occasion to refer to them frequently in this report hereafter.

Effects on the Red River.—It is plain that when their waters first came together, the inevitable result would be the absorption of the Red by the Mississippi, and the rush of most of its waters down the stream of the greatest slope and velocity. This becomes the more evident when we reflect that the Red debouched directly into the Mississippi, and that it was furthermore completely cut off from its natural outlet—the Atchafalaya.

As the Mississippi, at that time, swept entirely around the bend now called Old River, and as the Atchafalaya became rafted in the manner before shown, the Red River would continue to flow into it as a forced tributary, until some subsequent great change should divert its course and direct it elsewhere. Throughout all the delta of the Mississippi, it is well known that its banks fall rapidly back from the river laterally; and consequently, the parallel back valley must be on a lower level on the same parallel of latitude. Hence the Red River, running through this lower valley, must necessarily be below the Mississippi; and this being universal on every parallel, it is evident that the plane of its slope has a less inclination also. In consequence, during its floods, and even at low water, the Mississippi would back up its waters into the former; and as these back waters had no natural outlet, they would be forced up the Red, Black,

Ouachita and Little Rivers and their numerous branches, perhaps for many miles. This would produce a constant retardation of the current of lower Red River, and a consequent precipitation of the earthy matter held in suspension, as this latter is lifted and carried along entirely by the velocity of the current, or by the mechanical action of the water in motion, as we have before seen. These depositions would cause the lower part of its channel to shoal; and the waters coming down from above, together with the back waters from the Mississippi, finding no sufficient vent, would escape in a sheet flow over the banks into the low bordering swamps, thus converting nearly all of this entire region into one vast reservoir, as far as the retardation extended.

No great and sudden changes can ever be made in an alluvial stream, however, without producing great efforts on the part of nature, to restore herself to her primary condition, or its equivalent. Hence the natural efforts of the back water in the Red River basin would have been directed towards cutting a new channel around and to the west of the Atchafalaya, in order to take the lower level of its valley to the sea.

The physical difficulties, however, attending the making of a new channel are well known. A cut-off, artificially made, and having all the advantages of a fall of from ten to twenty times greater than that of the stream in which it is made, is nevertheless many years in cutting an equal section. And crevasses upon the Mississippi, which are a type of the manner in which nature would have worked in the case in question, frequently pass away without leaving any permanent excavated traces of their existence. Indeed, the plough furrows, and the corn and cane stubble, remain in many cases as if the disturbing cause had been nothing more violent than a heavy, flooding rain.

It is plain, therefore, that the back waters in Red River could not have excavated a new channel for themselves, but could only have escaped laterally, in a sheet flow, over the lower levels of the valley of the Atchafalaya, to its entire submersion in times of floods. This is obvious, from the fact that the water once discharged into this lower valley, could never return again to the Mississippi by the same channel. Consequently the meeting had forced the Red River to be tributary to the Mississippi, and its valleys to become a reservoir for the discharge of the surplus floods of the latter, partially on account of the rafting of the Atchafalaya.

Effects upon the Mississippi.—The sudden accession of the waters of Red River to its volume, would cause the Mississippi to change its regimen. This change could not have been very great or sudden, however, as the Atchafalaya, until it became rafted, partially compensated for the accession from Red River. In time, this river accommodated itself to the new order of things, discharging its surplus in the meanwhile over both of its banks into the low swamps behind.

It is plain, furthermore, that at that time there could have been no question of low-water navigation, excepting at the mouth of, and in lower Red River, as what is Old River now, was then the Mississippi.

Such had probably been the condition of these rivers for ages, and this was their condition and their several relations at the time they were first discovered by the Europeans, and thence up to the year 1831, when our troubles regarding navigation began to be really serious.

SHREVE'S CUT-OFF.

It is irrelevant to this discussion to introduce the changes wrought by civilization in the establishment of its homesteads, and in preparing the lands for cultivation. Nor yet is it affected, up to this point, by the commencement of levees in and around the city of New Orleans in 1727, and their gradual extension up and down the coast, until, as at present, the Mississippi is confined within parallel embankments. These had nothing whatever to do with our present difficulties in the low-water navigation between the Red and the Mississippi Rivers.

The cause of their origin was very different; and it only adds another instance to the long list of evils which have resulted from the many partial works constructed in this State, entered into without due survey and reflection, and executed without intelligence or skill, for the doubtful benefit of one section of the State, to the prejudice and injury of many others. What was here attempted as an amelioration of a partial evil, was largely productive of a greater, as, indeed, might have been ascertained upon due investigation. I allude to the cut-off made by Captain Shreve, in 1831. To improve the navigation at the mouth of, and in lower Red River, which was rapidly deteriorating, from the deposition at its mouth, caused by checking the current, as we have before seen, recourse was had to this popular but pernicious method of obtaining immediate relief.

A perfect cut-off produces, together with other results, a sudden fall of the whole river, at and above the point where made.

It is hence evident that there would result temporarily, from this work, the immediate benefit required. The Mississippi having suddenly fallen at the mouth of Red River, there would necessarily be less back water in the latter, and consequently an increased current and greater fall.

Red River would, therefore, tend to free itself from the shoal bars at its mouth, and to wash out the light deposits which had accumulated in its bed for some distance above. This benefit could not of necessity be permanent or lasting. For, by thus throwing the Mississippi further to the East, it was partially separated from Red River, and, to a certain degree, both rivers were forced to assume their original independent channels.

Several natural causes would tend to widen, if not to complete this separation, two of which, especially, were prominently active.

1. The tendency of the Mississippi to close up the gorges of its old bend

by annual deposits in them. This is an invariable law, which operates in every cut-off, whether natural or artificial; and of the effects of which lakes St. John and Concordia, in the parish of Concordia, a short distance above, may be instanced as perfect specimens on the Mississippi. There are many other similar cut-offs throughout the State, which have completely closed their gorges by this same natural process, and which are familiar to every one.

2. The renewed efforts of the Red River to reach the Gulf by the lower levels of the Atchafalaya, from the increased activity which it received under this change of regimen and artificial separation.

Additional power and increased activity were also given to the operations of these natural causes by the labors of man. For, in 1833, two years after the cut-off had been made, a Board of Public Works was incorporated, under which the internal improvements of the State began to be developed. The removal of the rafts obstructing the Atchafalaya and Grand Rivers, and Bayou Sorrel, being urgently demanded by the necessities of the case, was among the earliest of its operations. In order to open the navigation through these streams to the Attakapas, a labor required by an increasing population, man performed by the removal of these rafts that which nature was unable to do without such assistance, as we have before seen.

When these rafts were partially broken and removed, the increased current velocity of the Atchafalaya soon washed out the light deposits in its channel. By the annual assistance which it received from the Internal Improvement Department, this river rapidly assumed its original capacity to vent the waters of Red River, with an increased ability to carry off the back-waters discharged into the Red River basin by the Mississippi. The efforts of both of the latter rivers were joined in the same direction—the Red River striving to regain its natural outlet by the lower levels of this valley, supplied water and current for the abrasion; and the Mississippi, by using the lower Red and all of Old River as a reservoir, greatly weakened and retarded the currents in the latter, and hence there resulted a rapid precipitation of alluvial deposit, and consequent shoaling throughout the entire channel of Old River. Its lower gorge was closed in a few years, while bars and shoals were more gradually forming in the upper gorge, and islands and shoals in all that part of its channel from the mouth of the Red River to the Mississippi. Besides, the Mississippi kept receding further and further to the East, by a vigorous abrasion of its left bank, while as rapidly battering the right bank and filling the gorges of its old bend, until it has taken up an equated position at some considerable distance from the place where Shreve originally cut his canal.

It is plain, from these facts, that this cut-off, together with the removal of the Atchafalaya rafts, had in a great measure restored the Red and Mississippi Rivers to their primary condition, before the meeting of their

waters, giving each a tendency to the Gulf by its own independent channel. The connection of the Red and Atchafalaya with the Mississippi, was made to depend entirely upon the navigation of the old bend of the latter, now called Old River. This was rapidly filling up from the effects of natural causes. In short, the cut-off had only transferred the difficulty from the mouth of the Red to the channel of Old River, and had greatly impaired the navigation, instead of improving it.

In its annual report for January, 1839, the old Board of Public Works reports as follows: "Since the meeting of the Board, in May last, we have learned that the effects of the cut-off in the Mississippi, near Red River, has produced considerable obstruction to the navigation of the latter stream, and that fears were entertained that the communication with the Mississippi would be lost."

This was before the rafts were entirely removed from the Atchafalaya, as P. O. Hebert, State Engineer, reports in 1847, that this river "was filled with raft and floating drift, from two miles above Bayou Pigeon to within seven miles of its head," which obstructions were not removed completely until within the past few years.

Thus, from the time that Shreve's cut-off was made, in 1831, up to the year 1839, and for every subsequent year thereafter, the navigation of Old River deteriorated more and more, until it became the subject of universal complaint to all of the sections of the State at all interested in having it kept open.

RACCOURCI CUT-OFF.

Among the many plans suggesting themselves for the amelioration of the low-water navigation of Old River, it is singular that no other method could be thought of than a recurrence to a second cut-off, especially after the experience of the fatal consequences of the first. With this object in view, however, the Raccourci Cut-off was proposed and finally completed in 1847.

Here is another instance of hasty legislation rushing into unknown and greater evils, merely to escape for the moment an existing one. Notwithstanding the efforts made by P. O. Hebert, State Engineer, to arrest the progress and final execution of this work—and in despite of the warnings of other able engineers of scientific attainments, who cautioned the Legislature that this proposed cut-off would not produce the benefits expected of it, but that it would only cause the inundation of lower Louisiana—still, this last crowning work was ordered into execution.

As was predicted of it, and as might have been anticipated from the character of its effects, this work led to an early and complete separation of the Red and the Mississippi Rivers, by giving additional power and activity to all the causes which we have seen in operation, assisting them the more rapidly to destroy this very navigation through Old River, which it had been made to improve.

This cut-off was completed in 1847. Since then, Old River has filled up, not gradually, but with extraordinary rapidity. Every river pilot will confirm this; and it is, furthermore, attested by the annual legislation invoked by general complaint for its improvement. Since that time, furthermore, the rafts in the Atchafalaya have been completely broken, and to a great extent removed, so that its channel is now widened and deepened to something like its original capacity and magnitude.

The rapidity of the changes resulting to Old River from these cut-offs, is fully-illustrated by the following attached lithographic maps :

Map A.—From the map of M. Bm. Lafon, Civil Engineer, made in 1805, which shows the relations between the Mississippi, Red and Atchafalaya Rivers, twenty-six years before Shreve's cut-off was made.

Map B.—From the surveys and map of George T. Dunbar, Engineer Board of Public Works, made in 1839, eight years after the cut-off was made, which faithfully illustrates the filling of the gorges of its old bend by the Mississippi. It also exhibits the soundings in these gorges at the time, as well as those at the mouth of Red River, and at the head of the Atchafalaya.

Map C.—From the surveys and soundings of L. Hebert, State Engineer, made in 1855, and in 1856, showing the further progress of the filling of the gorges, and the formation of islands in the upper part of the loop cut-off, from the mouth of Red River to the Mississippi. This map was made after the rafts were removed from the Atchafalaya. A comparison of the soundings laid down upon this map with those upon Dunbar's map, made fifteen years before, shows the rapidity of the deepening of the head of the Atchafalaya, after the removal of its rafts and the increased velocity of its current.

Maps D and E, on file in this office, exhibit still further changes, subsequent to the making of the Raccourci cut-off, and its effects upon the gorges of its old bend.

In consequence, therefore, of the making of these cut-offs and the removal of the Atchafalaya rafts, Nature has at length triumphed in the execution of her universal and unchangeable laws. And while the Legislatures of 1859 and 1860 were passing the foregoing acts, anticipatory of a separation of the Red and Mississippi Rivers, that result had in reality already taken place, for all the practical purposes of low-water navigation, and the waters of the Red and the Atchafalaya were effectually blended into one stream, flowing majestically, in one unbroken channel of over two thousand miles, from the Rocky Mountains to the Gulf of Mexico.

This has probably been the case for several years past; and it will be endeavored to be proven, further on in this report, that this separation has been any thing but a misfortune to the best interests of the State.

PROOFS OF THE DESTRUCTION OF NAVIGATION.

In evidence of the complete destruction of the low-water navigation, I will adduce the following facts:

In July last, between the 1st and 19th of the month, when there was about five feet of water over the bar at the mouth of Old River, the surface currents invariably set in, in every instance, from the Mississippi towards the mouth of Red River, and with the following velocities:

At two miles from the mouth, the current was, at that time, 1.7 feet per second. At two and three quarter miles, it was 1.3 feet per second. Below the islands, in the channel of Old River, the current was 1.0 feet, still setting in. Continuing in the same direction, the right hand channel around the islands had a current of 0.66 feet per second; and the left hand channel a current of 1.2 feet per second, both setting in.

The surface current of Red River set up stream from its mouth at the rate of 0.45 feet per second, whence it slacked up to a point about five miles above the mouth, and then came to a stand, or dead water.

The current through the head of the Atchafalaya was, at the same time, 4.16 feet per second. At the distance of one mile from the head, its current was 2.1 feet per second; and three miles below, it was 2.0 feet, which is about its average velocity there, for that stage of water.

The mean areas of the water sections of the mouths of these three rivers were, at the same time, as follows:

Old River.....	9,119	square feet.
Red River.....	30,741	" "
Atchafalaya.....	7,061	" "

These sectional areas and velocities give us the following discharging capacities:

Atchafalaya.....	29,390	cubic feet per second.
Red River.....	13,833	" "
Old River.....	19,149	" "

In other words, the discharge of the Atchafalaya, at that time, exceeded the combined discharge of both the Red and Old Rivers—as the back current in Red River more than compensates for the slight excess. It is plain, therefore, that the Atchafalaya discharged not only the waters of Red River, but also those of Old River, which are wholly supplied from the Mississippi. The back water in Red River retarding its current, makes it equally evident that a constant deposition is going on at its mouth, and in the lower part of its course.

There are disturbing causes around the mouth of Old River which form eddies, which frequently give its currents the appearance of running out into the Mississippi. This has led casual observers to suppose that the currents of Old River are variable, and that they sometimes set in and

sometimes out at the same stage, in proportion as the supply from the Mississippi or from the Red River prevails. This is not the fact, however, and it is clearly disproved by testing the current at any point beyond the influences mentioned, when it will be found that the Mississippi invariably sets into Old River at all stages of water. This is so obvious from the fact of the lower levels of the valley of Red River, that it would hardly seem to require proof.

Character of the Bar.—The great difficulties in the navigation of Old River during low water, arise principally from the bar at its immediate mouth, and the many increasing shoals around and below the islands in the wider part of the channel. These latter shoals are getting worse and more numerous every year. The bar at the mouth is composed of very light and shifting alluvial deposit, which is constantly changing its position under the influence of the currents, but more especially under that of the eddies already mentioned.

In July last, these changes were so rapid that a boat in passing over the bar on her up trip, was almost sure to run aground in taking the same channel on her return. The Anna Perret, drawing five feet, grounded in going up on the 19th of July, by attempting the same channel which she had safely taken a few days before in coming down. After lying there some twelve hours, the soundings on her port side gave only one foot in depth from stem to stern, the light sands constituting the bar, having drifted around her to that depth in this short space of time.

On the 12th of August, the mouth was entirely closed to the passage of the Catahoula, at which time there was from eighteen to twenty inches of water upon the bar. It was subsequently reported to have fallen still lower.

On the 28th of September, shortly after one of the small class steam-boats had ploughed her way through the bar, there was obtained, by accurate measurements, the following results :

Actual width of water channel.....	170	feet
Average depth of channel	2.959	"
Sectional water area about.....	503	sq. "

Upon a due examination of the foregoing facts, the following conclusions are apparent to every one :

I. That the low water navigation of Old River is completely destroyed for all practical purposes ; and that, as the same causes are still operating, it must necessarily deteriorate more and more every year.

II. That the water supply of Old River is due to the Mississippi, both at high and low stages, and not to the Red River.

III. That the Red and Atchafalaya Rivers are unquestionably one and the same stream now, whatever may have been their former relations.

IV. And that there is a constant deposit at the mouth, and in lower Red River, owing to the retardation of its current by the back waters of the Mississippi.

Hence, Old River now, can only be regarded as a communication between the Red, Atchafalaya and the Mississippi during the continuance of high waters, at which times it also acts as a water-waste to the surplus floods of the latter.

PLANS OF IMPROVEMENT PROPOSED.

The question then arises, what can be done to improve the low-water navigation of Old River? We are now in a position to profitably introduce into this discussion, the several projects proposed by the Legislature in the foregoing acts. We will take them up in their chronological order. Act No. 269 of 1859, calls for the preservation of the navigation of Old River, and the prevention of the impending separation between the Red and Mississippi Rivers.

Now we have seen that the navigation of the former has already been destroyed, and that the separation of the latter has already been effected, for all practical purposes, as far as low-water navigation is concerned, which is obviously the sense of the act. The question then changes and becomes, how can we restore this low-water navigation in the one case? and thus renew the connection of these rivers in the other?

Can these results be obtained by completely damming Old River below the mouth of the Red, in order to cut off the Atchafalaya from its source of supplies, as proposed in act No. 29 of 1860; or will a partial closing of the head of the Atchafalaya be productive of the object desired, as proposed in act No. 30 of 1860?

Let us answer these in their order.

DAM ACROSS OLD RIVER.

It is wholly practicable to construct such a dam as is here proposed, which will forever dissolve the present connection between the Red and Atchafalaya Rivers, and which will force the Red River to become the tributary of the Mississippi, so that we will secure the permanent low-water navigation desired. To accomplish this, however, it is evident that wing-levees must be extended to connect with the Mississippi levees from one end of the dam, and to connect with the levees on Red River from the other. Otherwise there would be a lateral escape of the waters of Red River, flowing behind and around the dam, in their efforts to regain the lower levels of the Atchafalaya. In thus making the Red River a tributary of the Mississippi, advantage should be taken of the superior capabilities of the lower branch of Old River for the purpose. This we can accomplish by throwing our dam directly across the head of the Atchafalaya, and by cutting a canal through the narrow neck of batture, between the upper and lower branches of Old River, to establish the connection at that point. (See line *a b* on attached map C.)

The reasons for this are, that this lower branch was the original slope of

the Mississippi, that it has a more natural and less abrupt curve for the discharge of the water, because it is deeper and is not obstructed with islands and shoals, and because it has a greater descent in its water plane. Although I consider this work practicable and capable of accomplishing the ends in view, yet, nevertheless, I am forced to abandon it for other reasons. Its cost will be immense, yet not so great as to render its feasibility nugatory, were it not for the evil consequences which its adoption will produce, which are provided against in the act, and which will be discussed in this report hereafter.

ESTIMATED COST OF THIS PLAN.

	Cubic y'ds.
Dam across the head of the Atchafalaya.....	195,600
Levees to connect the ends of the dam with the levees on the Red and the Mississippi Rivers at the nearest points.....	3,691,306
Cutting canal through batture between the upper and lower branches of Old River.....	75,777
Total cubic yards of cutting and embankment	3,962,683
Which, at 25 cents per cubic yard, will cost.....	\$990,670 75
Add for contingencies, inspections, etc.....	5,329 25
Total cost	\$996,000 00

The necessary expenses of increasing the height of the levees on the Mississippi, on both banks, above and below the mouth of Old River, are not included in the above estimates.

PARTIALLY CLOSING THE HEAD OF THE ATCHAFALAYA.

Relative to this project, its feasibility is increased by using the lower branch of Old River, and by cutting a canal to connect with the upper branch, for the reasons before given. The only proper and effectual manner of constructing this work, is to carefully groyne the left bank of the head of the Atchafalaya to prevent its further abrasion. Then to construct a powerful break-water from the other bank, with protecting groyned wings, and to project nearly across the head of the stream. Furthermore, such a curve and direction must be given to the break-water, as to direct the current of Red River through the lower branch of Old River, and thence through the canal to the upper branch.

By this method of constructing the work, we have surrounded it with every favorable circumstance. We have substituted the deep water of lower Old River for the shoal and difficult navigation of its upper branch, and have reduced the difficulties of the problem to the bar at the immediate mouth of Old River, and a shoal channel of only two miles in length from the canal *a b*, to the mouth.

As we have partly closed its natural outlet, a larger volume of Red River

would necessarily be thrown through this new channel, and to some extent upon the shifting bar at the mouth of Old River. When the differences of level between the Red River and the Mississippi are considered, it is not safe to presume that this increase of water will have any great scouring velocity, which alone would make it successful.

On the contrary, it is evident that our break-water only acts as a partial dam, and by making a reservoir of Old River, some water is, perforce, discharged into the Mississippi from a certain rise in the reservoir,—nothing more. It is evident, therefore, that we will still have to dredge the bar annually in order to secure our low-water navigation; and by harrowing and scraping throughout the reduced distance during low stages, we would probably preserve this communication for a few years to come.

ESTIMATED COST OF THIS WORK.

	Cubic y'ds.
Cutting canal through batture between upper and lower Old River	75,777
Which at 25 cents per cubic yard will cost.....	\$18,944 25
Break-water with groyned wings complete	35,000 00
Contingencies, inspections, etc	2,055 75
Total cost.....	\$56,000 00

There will be an annual expenditure in harrowing and scraping, not included in the above estimate.

Of the two plans under consideration, this is unquestionably the least objectionable in its consequences. The first would be permanent, however, whereas the last could only delay the evil day for a few years, within which time the natural causes at work would bring us back exactly to our present condition. A large sum of money would have been expended thus to secure a temporary benefit; as nothing is hazzarded in predicting the ultimate failure of this method, arising from the same causes which now produce the bars, shoals and islands in Old River. To accomplish the ends in view, and solve the problem thoroughly, the works constructed must be permanently successful. Otherwise there would be a constant expenditure of money, for useless and impracticable results.

PLAN PROPOSED BY L. HEBERT, STATE ENGINEER.

The second Section of act No. 262 of 1859, requires the recommendations made by L. Hebert, State Engineer, in his Special Report of February 7th, 1859, on Bayou Cut-off, to be taken as the basis of the future surveys for the improvements under discussion; and as these surveys were completed under the direction of that officer, and a project predicated upon them, it will be proper in this connection to examine the works which have been proposed by that gentleman.

His plan to improve the navigation through Old River, and to preserve

the connection between the Red and the Mississippi Rivers, as given in his Special Report of March, 1860, is as follows : To gradually close the Atchafalaya, at Simmesport, with a dam, with wing levees extending from the one end of this dam up the left bank of the Atchafalaya to Old River, and thence around to connect with the Mississippi levees.

From the other, or western terminus of the dam, the levees are to extend along the lower (right) bank of Bayou Des Glaises, from Simmesport to Moreauville, where the Des Glaises is to be diked ; thence to the Avoyelles prairies at the nearest point, and from the other side of these prairies across to the Red River, below Bayou Choctaw, and finally up the Red River to connect with its levees below Alexandria on the right bank.

It is furthermore proposed to open the Latanache as an outlet, to compensate for the water thrown into the Mississippi by the Red River, and as a source of supply for the Atchafalaya. In connection, also, to raise and strengthen the levees on both sides of the Mississippi, for fifty miles above the mouth of Old River down to its mouth.

It is obvious that this plan forces the Red to become tributary to the Mississippi, and that in its general features, it satisfies the requirements of Joint Resolution No. 29, of 1860. It has another feature, however, wherein the resemblance ceases, and which must be discussed separately. This is the proposal to feed the Atchafalaya from the Mississippi, through the Latanache, converting this latter, at the same time, into an outlet for the relief of the Mississippi.

Now the Latanache heads in the bend of the old river resulting from the Raccourci Cut-off. The upper gorge of this bend has already been closed completely by natural causes, fulfilling the constant law of all Cut-offs, as we have previously seen. In a like manner, also, the lower gorge has greatly filled up, so that at the present time it is obstructed by a bar, which completely closes it to canoe navigation in low-water.

The difficulties attending the making of a new channel, or enlarging an old one, even under the most favorable circumstances, are well known ; and hence it is reasonable to conclude, from the many obstacles surrounding the present case, that a century may perhaps elapse before the Latanache will enlarge sufficiently to equal the present discharge of the Atchafalaya, if, indeed, it ever enlarges at all under the circumstances. Therefore we may safely throw this element out of the future discussion.

ESTIMATED COST OF THIS PLAN.

	Cubic y'ds.
Dam across the Atchafalaya at Simmesport (taken same as at head).....	195,600
Wing levees to connect with the levees of Red River and the Mississippi	3,691,306
Dam across Des Glaises at Moreauville.....	13,333
Opening Latanache and straightening same.....	2,640,000

Leveeing both banks of the Latenache, from the Mississippi to Atchafalaya	1,689,600
Total cubic yards.....	8,229,839
Which at 25 cents per cubic yard of excavation and embankment will cost	\$2,057,459 75
Add for contingencies, inspections, etc	6,540 25
Total cost of plan.....	\$2,064,000 00

The cost of raising and strengthening the levees on the Mississippi as proposed, is not included in the foregoing estimate.

A work is impracticable to a State as to an individual, when it is beyond the means of the one or the other; and perhaps the expenditure of over two millions of dollars upon a single State work, even of the great importance and general character of this, is beyond the present means of the State of Louisiana.

My objections to this method of attaining the objects in view, are not founded upon its cost, however, but upon other considerations much more serious in their character and consequences as I shall now proceed to show :

INUNDATION RESULTING FROM THE ADOPTION OF EITHER OF THE PROPOSED PLANS.

Another element of the very highest importance here enters into the discussion of this question. This is the effects which will be produced by inundation upon the adjacent and distant country, and the changes of regimen, slope and velocity, which will be assumed by these several rivers and their tributaries, resulting in times of flood, from the adoption of either of these proposed works. This will be simplified by showing the present condition and relations of these several rivers and their adjacent tributaries, when the changes resulting from either plan, will become the more apparent.

Present Relations.—As things now exist, we have the Red and the Atchafalaya Rivers constituting one and the same stream, which flows in a valley nearly parallel with that of the Mississippi, and connected with the latter during high water by that waste-wier called Old River.

Owing to the rapid lateral slope of the banks of the Mississippi everywhere, this parallel back valley, occupied by the Red and the Atchafalaya, must be below that of the former river, and consequently their high and low water marks must necessarily be below the high and low water marks of the Mississippi, for the corresponding stage, on the same parallel of latitude. These facts are demonstrated by the lines of level run on every parallel, which we will illustrate by the following examples :

1. The section through Bayou Cut-off, made in November, 1857, gives the following water levels: High water mark of Red River, three feet

below that of the Mississippi. Low water mark of Red River, five feet below the low water mark of the Mississippi.

2. A line run between the two rivers, about two miles south of Bayou Cut-off, gives the high water mark of Red River three and eight tenths feet below that of the Mississippi.

3. The high water mark of the Atchafalaya is fourteen and one-tenth feet below that of the Mississippi, through the Latanache section.

4. The high water mark at Indian Village is twenty and two-tenths feet below that of the Mississippi.

5. There is no difference in the levels of the high water marks of the Mississippi at 'Torras' and that of the mouth of Red River, owing to their direct connection through Old River.

6. The high water mark of the head of the Atchafalaya is seven-hundredths feet below that of the Mississippi at 'Torras', showing that these differences of level hold good, even through the Old River section; and similar results would be shown by the sections on any other parallel.

From Bayou Cut-off to the mouth of the Old River, a distance of twenty-one miles by way of the Mississippi, the fall of the latter is 7.87 feet, or nearly 4.5 inches per mile. The distance from the same bayou, by way of the Red River to the mouth of the latter, is about fifteen miles, and the fall of the Red River between these points is 2.72 feet, or a little over 2 inches per mile. Hence we have lower levels and a less inclination of the plane of descent of the Red River compared with that of the Mississippi.

It is conclusive, therefore, that the waters of the Mississippi must flow into the Red and the Atchafalaya Rivers, even at the lowest stages, as its water marks are higher at every stage. This fact has already been indicated in the currents through Old River previously given.

It is equally conclusive, furthermore, that the Mississippi, during high water, will back up the Red River, owing to the lesser inclination of its slope, directly in proportion to the highth of the water mark in the Mississippi above that of the Red River. Therefore it requires no further demonstration to prove that the only possible case in which any of the waters of the Red River could flow into the Mississippi through Old River, would be when the former should rise, from some extraordinary cause, above the water marks of the Mississippi, upon the same parallel of latitude. Such cases must naturally be so rare and unusual, as to justify us in throwing its consideration out of the question. Hence we have now two injurious effects to Red River and its adjacent country, from the Mississippi waters through Old River :

1. The deterioration and complete destruction of the low water navigation of Old River, ruining the trade and commerce of Red River and the Attakapas.

2. The retardation of the Red River current at and above its mouth, and

the consequent shoaling of that part of its channel, causing, besides, a gentle overflow of the surrounding low country during low water.

During the prevalence of high water or floods, the question assumes a very different aspect. The Mississippi then rushes through the gorge of Old River, and finding the high water slope of the Red River of easier descent than its own, and the Atchafalaya being unable to vent these additional waters as rapidly as they are forced upon it, they are necessarily backed up the Red River for many miles, overflowing its banks and flooding the entire country. Every ordinary high water backs up as far as the falls at Alexandria ; and at times of extreme floods, the waters are backed even above the falls. They are well known to extend up the Black River, and thence up the Ouachita to the mouth of Bayou Bartholomew, a distance of over three hundred miles. This back water also extends up the Tensas and Little Rivers, as well as through all the outlets and branches of these several streams, overflowing all of the adjacent low country.

The current of the back water is sometimes so great at Trinity, the junction of the Ouachita, Tensas, and Little Rivers, that it has been known in its first rise, to transport rafts up the Ouachita to Harrisonburg, from that point.

In fact, the levels previously given of the sections through the Lata-nache and Bayou Cut-off, exhibit the fact that the high water mark of Red River, at this latter point, is 11-10 feet higher than it should be, and which is due entirely to the back waters from the Mississippi.

A glance at the map of Louisiana will show us the great extent of low country annually subjected more or less to inundation from this back water ; while at the same time, the streams throughout all this region, have sufficient capacity within their banks, with an ordinary amount of leveeing, to carry off all the drainage and flood waters which naturally belong to them.

What immense interests are here sacrificed, when we reflect that many of these lands are in cultivation, and that the low lands thus inundated, commonly called swamps, are among the best in the State, and are swamps no more, but are at once fit for culture from the moment that an outlet is afforded to the waters which cover them.

Nor is this all ; the water in this great basin occupies valleys which we have shown to be below that of the Mississippi. It consequently follows that it must find a new outlet to the Gulf, as it surely cannot flow back into the Mississippi, as the floods of this river recede. The levels previously given make this obvious.

It therefore follows that it flows down the Atchafalaya and over the low country bordering upon this stream, backing up its branches and renewing the same inundating process everywhere below, which it first performed in the parishes above. It is evident that these results should obtain, as

we add a whole river to the Atchafalaya through Old River, when it is already full from its natural sources.

Just look at the map and see the extensive territory drained by the Atchafalaya, the Red having its source in the Rocky Mountains, while many of its tributaries come in from Texas and Arkansas. In fact, with the exception of Calcasieu, Lafourche Interior, and the Florida parishes, the remainder of the streams of the State, are principally discharged through the Atchafalaya, together with the Mississippi surplus through Old River. This is evidently a case of extreme servitude. Besides, there is a further accession to this large volume of water in the Atchafalaya, by a second installment from the Mississippi through Bayou Plaquemine. The Mississippi surplus discharged through this bayou during floods, would not, to any considerable extent, submerge the lower Atchafalaya and its valley, if this were the only accession thereto.

The injurious effects produced by this bayou upon the Attakapas, arise from essentially different causes. They are these :

1. The tendency of the Mississippi drift to float down the Plaquemine, to raft and choke up all of the outlets of the Atchafalaya, among which we may enumerate the Sorrel, the Tensas, Grand River, the Pigeons, Lake Chicot, and Grand Lake. These rafts prevent the free flow of the water, and consequently cause it to back and overflow the country above the rafts.

2. The tendency of the Plaquemine to shoal lower Grand River by deposits at their junction, occasioned by the check given to the current of that river, by the greater velocity of the current of Plaquemine. During high water, the average fall of the Plaquemine is 2.38 feet per mile, whereas that of Grand River is only 0.40 feet per mile. The meeting of these unequal currents, in almost opposite directions, checks and retards that of Grand River for nearly nine miles above the confluence of these streams, and which causes a shoaling of the river channel throughout that distance, to the detriment of navigation and the submersion by back water of the country above.

The overflow of the low lands of the Attakapas, however, is less the result of the waters discharged over it by the Plaquemine, than of the great excess coming down from the Red River, together with the Mississippi surplus through the Old River.

It is, hence, plain that Old River and Bayou Plaquemine, bear mutual relations to each other, and that they have many points of similitude. They both connect the Mississippi with the Red and the Atchafalaya Rivers; both act as outlets for the discharge of the surplus waters of the former on the latter, and both are high water communications to the commerce, travel, and products of the country—the one for the North and the North-Western portion of the State, and the other for the Attakapas. Consequently, to be entirely successful, both of them must be embraced in any

adopted plan, for the complete reclamation of the country in question, as well as to secure low water navigation to their respective regions.

In reference to the effects produced upon the Mississippi, by the existing state of things, I can only observe that if outlets are in reality beneficial to an alluvial stream, like the Mississippi, then we may rejoice in that of Old River. For I am thoroughly convinced that it is utterly impracticable, and indeed impossible, to make an outlet to the Mississippi at any place between this point and the salt marshes, that will exceed the relieving capacity possessed by Old River.

As changes will be proposed hereafter in this report, which will effect Old River and Bayou Plaquemine as outlets, it becomes necessary to examine other points on the Mississippi, in order to seek a corresponding relief elsewhere.

PROPOSED SITES FOR NEW OUTLETS.

Abstractly speaking, outlets can be made at many points, but from the salt marshes at the head of the Passes, up to the mouth of Old River' every sight hitherto designated, is more or less objectionable.

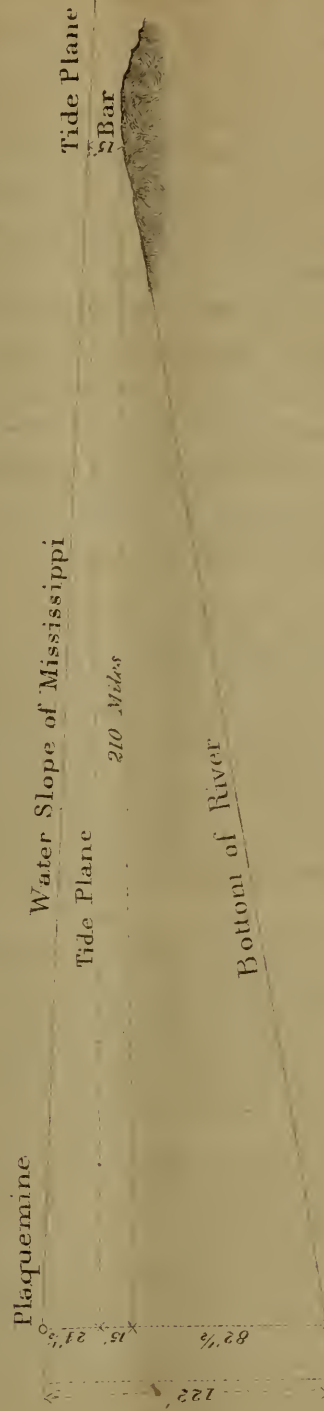
Those cutting from the left bank of the Mississippi into lakes Borgne, Ponchartrain, or Maurepas, are objectionable, because that in time they would fill up these lakes with their deposits, and consequently destroy this lake navigation to an extensive commerce. Those from the right bank, as through Lake Moreau to the Atchafalaya, or enlarging the Plaquemine, because this country is already subjected to such an excessive servitude from the Mississippi, together with the waters of Red River and its branches, that it can bear no more.

To enlarge the Lafourche, is also objectionable, in consequence of the excessive cost in damages which would result from disturbing the agricultural interests of so populous and wealthy a portion of the State.

Between the Lafourche and the salt marshes, on the right bank, the injurious effects of an outlet, and the lack of capacity of the streams and lakes behind to carry off the water which would be discharged into them by an outlet from the Mississippi, were clearly exemplified by the Bell and LaBranche crevasses in 1858.

The country behind those crevasses is filled with fresh water lakes, and nearer the Gulf, with tide water bayous and salt marshes, with ample outlets to the sea. These are quite capable of performing their natural drainage of the land slope of the Mississippi and the parallel valley behind. But when this basin became the recipient of the discharge of the crevasses mentioned, in addition to its own waters, all the adjacent river plantations were submerged, as well as those on bayous Barataria and Pierrot, while the waters even rose above the wide expanse of the salt tide marsh, down as far as Barataria Bay and the Gulf Coast. The water stood over the marsh around Little Lake at a depth of from five to six feet. An out-

Fig. III.



let cut from the English Turn to Lake Borgne, is probably less objectionable than any other place which can be selected. The impracticability of making an outlet of any considerable size, even at this most favorable location, will be evident from the following facts :

In the first place it would fill the lake, and so close itself by its own deposits in a very short time. The large amount of this deposit, and the rapidity of its precipitation, when the current is constantly checked, is illustrated by the fact, that the outward extension of the land at the immediate mouths of the Mississippi, is one mile in about fourteen years, as determined by United States surveys, and one mile of the whole front of the delta is estimated to extend in from ninety to one hundred years. Consequently we may open an outlet at the English Turn to any given depth or width, and assist its cutting by every artificial means ; but just so sure as nature's laws are unchanging and unchangeable, just so sure will this outlet contract its channel and shoal its bed, and subsequently its source or head at the Mississippi, until it becomes a mere waste-wier like the Lafourche or Plaquemine.

Bayou Manchac was an outlet of the Mississippi until a recent date ; and the Lafourche and the Plaquemine continue to be outlets still. At one time, doubtless, they were the main passes of the river, before the delta had extended in its outward progress towards the Gulf and left them inland. Do these continue at their original depth and width—that of the Mississippi? They remain to answer this question negatively. The same fate attended many other outlets, traces of which are frequently evident, and all of which were closed by the same natural means.

In addition to the causes operating to close a cut-off, or as at present to close a natural outlet like Old River—for since the opening of the Atchafalaya, it is really nothing else, as the argument is the same whether the outlet discharges into a river, a lake, or the sea—there was still another cause at work in these cases. This was simply the formation of bars at the mouths of these outlets—the undeviating law of debouchement of all sedimentary streams, which caused them to fill the more rapidly, by working from both ends at the same time. Let me illustrate this point more clearly. See annexed diagram, (Fig. III.) The distance of the head of Bayou Plaquemine from the Balize is, in round numbers, two hundred and ten miles. This, at 1.4 inches per mile, (as was determined in a recent survey to be the average fall of the high water of 1859,) gives us the surface water at Plaquemine 24.5 feet above the surface water of the Gulf; or, in other words, if the tide plane were produced to Plaquemine, it would be 24.5 feet below the surface of the water at that place.

Now, the depth of the Mississippi at Plaquemine is 122 feet, and the depth of the water over the bar at the mouth is only 15 feet. Deducting 24.5 from 122 feet, and we find the level of the bottom of the river at this

place to be 97.5 feet, referred to the tide plane ; or 82.5 feet lower than the bottom over the bar.

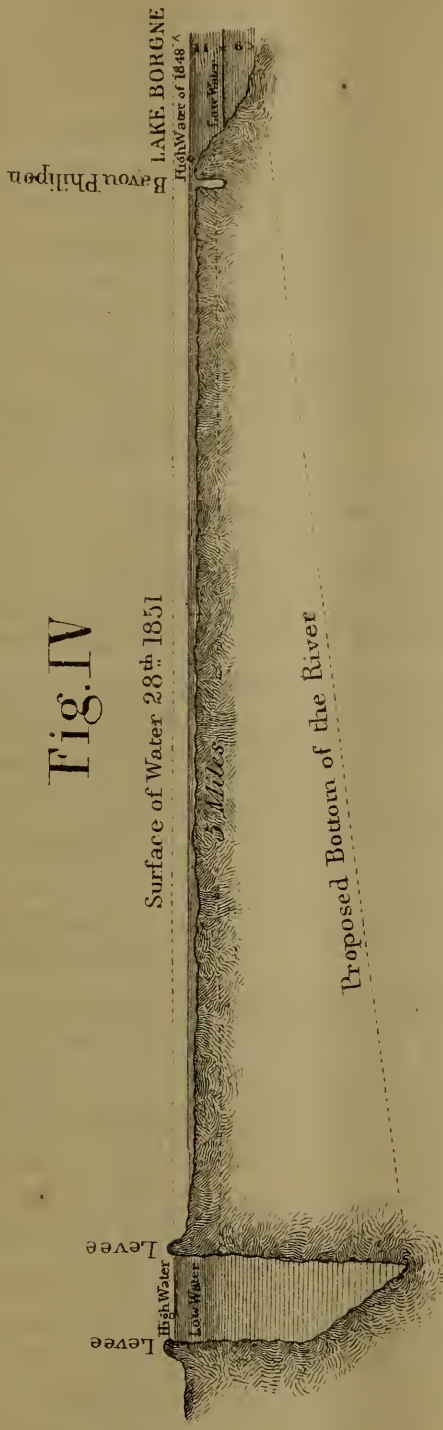
It is evident from this, that the great volume of water is acting, as it were, constantly up hill from that point, by which its friction is increased, and the velocity of the current diminished. Now, the least check in the velocity of the current hastens the deposition, and, as a consequence, we have a constant filling from the sea inwards.

This argument will be still more forcible, if a shorter stream, like the proposed outlet from the Mississippi to Lake Borgne, be taken as our illustration. The distance between the river and the lake, is about five miles, and the mean surface of the lake is eleven feet below the high-water mark of the Mississippi. The Coast Survey soundings of the lake do not give us a depth exceeding nine feet. Upon this data, (see annexed diagram, Fig. IV,) the action and results required of the proposed outlet may be enunciated in the following proposition :

Required, to excavate a prism of solid earth, five miles long and one hundred feet deep, entirely by the action of the abrading power of the velocity of the Mississippi current, with such artificial assistance as man can give it—the average fall of the high water through the outlet, being given at 2.50 feet per mile.

Now the average fall of Bayou Plaquemine, during high water, is 2.38 feet per mile ; and yet it is very questionable if this stream has ever sensibly deepened its channel. The fall of the water through the Raccourci Cut-off, when first made, was at the rate of 6.50 feet per mile ; and yet, even at the present day, the river section through this cut-off does not equal that of the average section above or below it, with all the superior advantages which it possessed as a cut-off over the abrading power of an outlet. It is obvious, therefore, that this solid prism could never be removed by the action of the current, combined with all the assistance which man could render it.

Let us suppose, however, that it were removed entirely to a depth corresponding with a plane connecting the bottoms of the river and the lake. Is it not evident that the current, even then, would be confined entirely to the surface during floods, whereas the bottom current, which is to perform the labor, would be retarded ? Fig. IV. makes this conspicuous. It must be remembered, furthermore, that we only have a current at all during high water ; the low-water mark of the river being about the same as the mean level of the lake, at which times the outlet would fill with its own depositions. Besides, the deposits made in the lake during floods, would soon check, if not completely destroy, the surface current of the high water. This is the active agent now engaged in filling up the Lafourche from its mouth towards Lockport. The Lafourche, however, is about one hundred and seventeen miles in length, whereas our proposed outlet into Lake Borgne



is only five miles, and it is reasonable, therefore, to suppose that it would fill with still greater rapidity.

This cause is also operating rapidly on the Cut through the Right Bank of the River, near the head of the Passes, called the Jump, which is fast closing in from the Gulf in the same manner, with a willow growth on its batture. It has caused the frequent changes of the Passes at the mouth of the Mississippi, making an impassable mouth navigable at one time, and destroying the navigation through the best of the mouths at other times. It has acted on, and closed all of the upper, natural outlets of the delta, and would, at once and forever, continue to act upon our artificial outlet at Lake Borgne, or elsewhere, until it would become a mere waste for high water discharge, however deep and wide it may have been made originally. During low water it would be impossible to prevent its filling from natural causes, and we are, therefore, led to conclude that the making of new outlets is utterly impracticable.

ARE OUTLETS BENEFICIAL?

The question of Outlets may at first appear irrelevant to this discussion, but it is in fact so intimately blended with our subject, that it cannot be avoided. As there has been a great deal of able discussion, and many skillful and plausible theories advanced for and against outlets as a source of relief for the floods of the Mississippi, I shall strictly confine myself to such facts as bear upon the subject in hand.

The question naturally divides itself into two heads :

1st—Is it practicable, or can we relieve the floods of the Mississippi through lateral outlets ?

2d—Or, should our dependence be placed entirely upon a thorough and proper system of levees ?

I. *Levees*.—It is evident and conclusive, in the first place, however, that the productive wealth and the general prosperity of Louisiana, mainly depend upon the vast agricultural resources of her fertile lands ; and in the second place, that the most valuable of these lands are, to a great extent, worthless without levees. Hence, whether we make outlets to discharge the surplus waters of the Mississippi or not, our levees must be pushed forward over a very large portion of the State, wherever we expect to bring the lands into cultivation. This is self-evident. If the face of the country was unprepared by nature for the habitations of man on its first discovery, art, by the construction of levees, has overcome in a great measure the obstacles preventing its occupation ; until now, the interests are too large to be abandoned, and science, skill and intelligence must perfect the system which has been inaugurated.

At one time, the system of colmates might have been practically introduced, and the low lands of Louisiana raised by annual deposits, as has

been successfully practiced in the reclamation of the Pontine Marshes of Italy, or as is now gradually going on, upon a large natural scale, upon the banks of the Nile in Egypt. This system requires great length of time, and our lands are no longer marshes, but are now highly cultivated plantations, teeming with the richest products of the earth, and which cannot be abandoned to this tedious process of reclaiming them, without the most destructive sacrifice.

The levee protection must, therefore, be continued over them. The subject opens at once into a wide range, and directs inquiry upon many points of the greatest interest to thousands.

What is to be the ultimate effect of the levee system? Should new outlets be opened? or, should those in existence be closed, and dependence be placed entirely upon levees? Do the annual floods increase or diminish with the opening of the West, and the leveeing and draining of the States above us on the river? What are the best means of protection for the lower country? How shall the millions of acres of swamp lands be reclaimed, without this reclamation affecting injuriously those already under cultivation?

These, and many other similar questions will at once present themselves to the mind of any one, on duly investigating this subject. I must confess that our data is indeed very limited, considering the numberless chances presented for scientific observation, in the frequency of the floods and by numerous crevasses. With the exception of a few isolated cases, sufficient observations have not been taken to enable us satisfactorily to answer all of these questions, and until this is done, discussion will be futile and theories nugatory.

There are some general facts, however, which experience and private observation have supplied, regarding the habits of the Mississippi, which will partially assist, and warn us when we go too far beyond the line on either side.

I am convinced, in the first place, that nearly every crevasse which has occurred in lower Louisiana, was the careless result of gross negligence, and of weak and badly constructed, or caving levees. I am sure that such was the case in regard to the Bell and LaBranche crevasses. No Engineer would risk his reputation by erecting such insignificant banks of earth, to resist the pressure of the passage of a boat, on an ordinary canal, as are frequently put up as levees on many points of the coast. And yet these frail structures, even when partially water soaked, and with the water within a few inches of their crests, are expected to resist the abrading velocity of the Mississippi currents, with its thousands of boats, and all the wearing effects of the winds and waves.

To increase the height, and prevent the waves from washing over the levee in high water, a common practice is, to set a board upon its edge on

the water side of the crown of the insecure levee, and sustain it in its place by pickets driven into the levee itself, and by a few barrows of earth thrown against it from behind. Who has not seen the negroes engaged in this operation on every plantation where the levees were thought to be insecure? Besides, look at the weak and irregular trace given to the river levees generally. Salient angles are exposed to the direct action of the current in a thousand instances; no prudent steps are taken to drain them from behind, nor yet is sufficient care taken in their construction and in giving them proper dimensions and slopes.

In short, can any one pretend to assert that our levee system is perfect? or, if we can call it a system at all, that it has ever been thoroughly tested?

II. *Outlets.*—Relative to outlets, it is conceded by all, and can be demonstrated in fact by the sections above and below the different mouths, that the Mississippi absorbs the Ohio, the St. Francis, White River, the Yazoo, the Arkansas, and formerly even the Red River itself, and yet is not sensibly widened nor elevated. And why?

1st—Because the velocity of the current of the Mississippi is accelerated by the initial impulse given by the accession of each tributary volume, and its channel is proportionally deepened. This phenomenon of the deepening of the channel of a sedimentary stream, by an increase of volume, is so constant in its exhibition, that the inference is irresistible, that it is a universal law.

2d—Because the floods from the lower tributaries have, for the most part, passed away before the floods come down from the tributaries above. This is one of the beautiful compensating provisions of Nature, regarding the Mississippi, that its great tributaries should flow through every variety of latitude and climate, in which the melting and breaking up of the ice and snow, and the consequent rise of their floods, should occur at different seasons. Formerly the floods of the Red and the Arkansas, the most formidable of the lower tributaries, flowing through nearly the same latitude and climate, did occasionally meet in coming down and caused the submersion of lower Louisiana. Such an instance occurred in the year 1828, three years before Shreve's Cut-off was made, when the Atchafalaya being rafted, Red River was a forced and unnatural tributary of the Mississippi. Although unparalleled in lower Louisiana, the flood of 1828 was not as excessive above the mouth of Old River, as the subsequent floods of the years 1849, '50, '51, '58 and 1859. But since the Atchafalaya has been opened, so as to vent the waters of Red River, the meeting of the floods of the tributaries from above has rarely happened.

Again, it is demonstrated, on precisely the same principles, that large bodies of water may be drawn from the Mississippi at a given point, and yet not lower the surface of the water to any appreciable degree below that

point. This was observed to be the case at the Bonnet Carré crevasse in 1850, as well as at the Bell and LaBranche crevasses in 1858 ; notwithstanding that the former has been variously estimated to have discharged 100,000 cubic feet per second, or about one-tenth of the total discharge of the Mississippi, and the Bell crevasse equalled, if it did not exceed, that amount. In the latter case, an appreciable fall of the surface water was scarcely discernable at New Orleans, and there the water subsequently actually rose. Similar results were shown by the other crevasses mentioned, and the fact is of constant exhibition at the mouth of Old River, and at the heads of the Plaquemine and the Lafourche.

The fact that the water is not lowered, is explained by the consideration that there is a direct check given to the river current by the suction of the outlet, and consequently an immediate deposition of sediment, forming a bar immediately below the mouth. This reduces the water section of the river, and hence keeps the flood up to its original levels. For no more water can pass through the channel, within a given time, than what can pass over its shallowest place ; so that it is evident that the deposit caused by the outlet itself, will thus modify the bed of the river to correspond to the reduced quantity of water, and so keep up the surface elevation.

The observations made at the time, upon the Bonnet Carré crevasse, clearly demonstrated the fact of a deposit being made. The sectional area of the river immediately below that crevasse, was found, on measurement by Prof. Forshey, to have diminished 75.613 square feet, as compared with the section above ; the shoal which had formed having diminished the mean depth of the river 12 feet.

The converse of this shoaling process was also found to be true. For when the crevasse had been closed and the levee rebuilt, and when the river had regained its velocity at the next high water, new soundings proved that the bar immediately below the crevasse had been washed away. Similar results were shown by the observations and measurements of Charles Ellet, jr., Civil Engineer, on the same crevasse, one of the ablest advocates of the outlet theory.

The bar which forms in high water, at the head of Bayou Plaquemine, is also found to remove and deepen itself to the depth of 11 feet, when the surface of the Mississippi falls below the bottom of the bayou, or when no water passes through it. So, also, there were immense deposits made in front of the city wharves, just below the Bell Crevasse, and which were subsequently removed at the return of high water, when the crevasse had been closed.

The same results are shown at the present time, by the immense deposits at and below the mouth of Old River, now acting, at all times, as an outlet of the Mississippi, and not as the discharge point of Red River, as has been shown. The bar extends out into the river for a considerable distance, so

that in ordinary water, on leaving the Red River Landing, to go up stream, the boats are compelled to cross to the left bank of the river to find a channel of sufficient depth.

We have the same bars at the head of the Plaquemine and the Lafourche, and, as far as our observations have extended, this seems to be the undeviating and universal result of every crevasse and outlet to the Mississippi. That these bars, at the heads of all outlets, should wash out when the outlet is closed, is evident from the fact, that the current increases with the volume of the water, and, consequently, the abrading power. With this increased current abrasion, either the sides or the bottom of the river must necessarily yield, so as to compensate for the increased volume. Now, it is demonstrated by measurements, from the mouth of the Ohio down, that the width of the Mississippi is generally very nearly the same, and that the depth of the river gradually increases in the same direction. In fact, the Mississippi is frequently called "the river of equal widths." It is, therefore, evident that the abrasion takes place upon the bottom, and not upon the sides; or, in other words, that the capacity of the Mississippi results from an increase of depth, and not from an increase of width.

These examples are, perhaps, too few in number to be regarded as entirely conclusive; but, as their evidence is all one way, it is entitled to due weight, and is preferable to all theories of every kind whatsoever. And, from this evidence, the inference is irresistible, that outlets afford no relief to the Mississippi, and, therefore, that they are in no way beneficial to that river.

RECAPITULATION, AS APPLYING TO THE EFFECTS PRODUCED BY THE PROPOSED PLANS FOR THE IMPROVEMENT OF THE NAVIGATION OF OLD RIVER.

We are now prepared to examine the effects produced by the adoption of either of the proposed plans for the improvement of the navigation of Old River, and, through it, to preserve the connection of the Red and Atchafalaya Rivers with the Mississippi.

In this view of the question, the total closing of the Atchafalaya, by a dam across Old River, as proposed by act No. 29, of 1860, and the closing of the same river at Simmesport, as proposed in the Special Report of L. Hebert, State Engineer, of 1860, may be discussed in the same connection: as the ends contemplated in each are the same, and as their effects upon the Red and Mississippi Rivers will be exactly similar.

Let us suppose either of these dams and its wing levees to be built. We have then obviously gone back to the very condition in which things stood before Shreve's Cut-off was made. We have again forced the Red River to be tributary to the Mississippi, and re-closed the Atchafalaya; only that the closing of the latter has been made complete and effectual, totally cutting

it off from the source of its water supplies, and thoroughly closing its valley to the discharge of the waters of Red River and the Mississippi surplus.

For these very reasons, the back waters from the Mississippi will extend further up the Red River and its branches than it has ever done before, and they, consequently, will be higher, and will continue to overflow the adjacent country for a longer time and to a greater extent. Although completely rafted in the former case, yet the lower levels of the valley of the Atchafalaya were still open to the discharge of much of this water, which our dam and wing levees now cause to drain unnaturally into the Mississippi. In thus furnishing navigation to the Red River country, we would drown out millions of acres of the lands in the basin of that river, easily susceptible of culture under the ordinary means of reclamation.

The Atchafalaya would be benefitted by these works, as far as the drainage of its lands are concerned; but its navigation would be impaired at once, and would annually deteriorate until, in a short time, it would be destroyed altogether. For we never can reimburse this lost supply from the Mississippi through the Latanache, on account of the natural causes now at work upon the latter, as we have before seen. Therefore, to give navigation to the Red River country, we have destroyed that of the Atchafalaya region and the Attakapas, as the only communication of the latter would depend upon the high water navigation through Bayou Plaquemine. Even this would be destroyed in time, by the accumulation of sedimentary deposits; because, the closing of its head would convert the Atchafalaya into a mere tide-water basin, which, deadening the impinging current of the Plaquemine, and so destroying it altogether, would force it to yield up the earthy matter held in suspension.

It may take the Mississippi some years to adjust and accommodate its channel to this sudden change of regimen, but I am convinced that it will do so eventually, as it has done in the cases of the Ohio, St. Francis, Yazoo, and Arkansas, and as it formerly did in the case of this river itself. While this adjustment is taking place, however, and even subsequently, we will have to apprehend extreme high waters, from the meeting of the floods of the Red River, with those coming down from the Arkansas and the upper tributaries. For it is well known that a very inconsiderable stream, suddenly discharging a large volume into a full river, produces a very material rise both above and below its mouth.

What, then, will be the consequences of a great rise in the Red River, when the Mississippi is already full from its other sources?

If past facts can be relied on, we may safely predict periodical recurrences of high water, exceeding the rise of 1828; for then the Atchafalaya still opened its valley to the escape of much of the surplus. This we have completely shut off by our plan of operations, and the Mississippi must be depended on alone, without any relief, to carry off these floods from the Red

and Arkansas, flowing through similar latitudes, and climates. The consequences will certainly be disastrous in lower Louisiana, if the levees there are not high and secure enough to meet the emergency.

All of these ruinous and destructive consequences are brought upon us, for what?

To secure low-water navigation for one section of the State, to the submersion of a large portion of that very section, the destruction of navigation to another large and populous section, and the subjection of the whole of lower Louisiana to the constant liability to inundation.

The object gained seems very small, indeed, compared with the immense interests sacrificed in attaining it. The cost of these works, besides, is a matter of serious consideration, even if they were productive of good, instead of evil. Unfortunately this is not the case.

It was a question of considerable discussion at the time, whether or not the State of Louisiana should accept the donation of the Swamp Lands offered her by the General Government, the proceeds of the sale of which were to be applied to the purposes of leveeing and draining her territory.

If such works as are here contemplated in Old River, be carried into execution, it is very unfortunate indeed, that the councils of those advocating the non acceptance of the Public Lands did not prevail. For the fund will speedily be exhausted, and, instead of having been a benefit to the State, it will only have proven an injury, by supplying means for the construction of expensive and destructive works, which, perhaps, would never have been contemplated, nor carried into execution, but for this donation.

Thousands of dollars of this Swamp Land Fund have already been squandered, and, if the inquiry be made to-day, where are your internal improvements, your levees and general system of drainage, and other public works of the State? what can we candidly answer, or what have we got to show? With but rare exceptions, only a few ditches of more than doubtful propriety or benefit, and occasional levees, badly constructed, isolated in location, and generally put up for sectional objects, without due regard to adjacent interests or the requirements of a well-digested plan for the good of the whole. Will the staunchest advocate of special legislation—that of looking at the general good of the State at large, from the point of view offered by the requirements of a single parish, and which orders works to be executed without regard to some general plan or system, and without due investigation founded upon the proper preliminary surveys,—point out anywhere a beneficial or satisfactory return for the immense sums expended?

We have seen that any obstruction placed in the channel, or in the valley of the Atchafalaya, is injurious in its consequences as things now stand; and hence the partial closing of the head of this river, as proposed by act No. 30, of 1860, would be detrimental, but only to a very limited degree. This work would not affect the Atchafalaya at all, and would scarcely be felt

upon the Mississippi. At the worst, it would only cause a slight additional rise in Red River from back water.

As the total closing of the Atchafalaya, therefore, is very costly, besides being highly improper and destructive from the disastrous consequences of inundation resulting from its adoption; and as the partial closing up of the mouth of this river, will, at best, only temporarily preserve the low-water navigation of Old River, what other method shall we resort to?

Must the commerce of the Red and the Atchafalaya Rivers, and the Attakapas, be completely isolated from the Mississippi, and the rich products of these sections be forced to seek some other market than New Orleans, or be subject to all the chance contingencies of high-water navigation alone in reaching that mart? Or can any plan be proposed to permanently improve the low-water navigation through Old River and keep up this water communication?

I most decidedly and emphatically answer, that no such improvement can be made in Old River.

The fiat of Nature has gone forth, and the Red and the Atchafalaya Rivers, in that sense, are separated forever from the Mississippi, and the low-water navigation through Old River, is permanently destroyed beyond any lasting amelioration within the powers of man. It is idle longer to turn our attention to the improvement of Old River. That has been long past permanent remedy, and every year it will grow decidedly worse. Science and skill will readily overcome all obstacles physically opposing themselves to the execution of any contemplated work, provided no constant law of nature is forever acting to destroy the forces put in operation to accomplish it. Whenever this is the case, instead of fruitlessly combatting insurmountable difficulties, we must take Nature as our guide, and work with and assist her, throwing all our efforts in the same direction. By doing so in the present instance, she leads us out of all our troubles, and presents a permanent, practical, and economical plan for accomplishing all of the ends in view, and attended, in its operations, by no evil consequences. By working against her, as we have seen, we entail on ourselves misery and destruction, in the one case, and accomplish nothing lasting or permanent, in the other.

PROPOSED PLAN FOR PERMANENT NAVIGATION, AT ALL STAGES OF WATER,
BETWEEN THE RED, ATCHAFALAYA, AND MISSISSIPPI RIVERS.

The plan which I would earnestly recommend to the Board, to the Legislature, and to the people of Louisiana, for immediate adoption, contemplates the complete closing of the mouth of Old River, and the virtual closing of the head of Bayou Plaquemine.

These two outlets are only navigable for a few months in the year, during the continuance of high water; and, hence, no one could reasonably desire to

keep them open for that purpose alone, provided, a more perfect water communication be substituted for them, and which will furnish navigation at every stage of water. Neither can there be any wish to keep them open as outlets *per se*, provided, that it can be proven that their closure will not injuriously affect the plantations on the Mississippi below them.

We have already shown the impracticability of making new outlets, so that, in case of closing these in question, we cannot look to that quarter for corresponding relief. But it has also been made evident, furthermore, to every one not completely stultified by prejudice, that every outlet to the Mississippi is to be regarded as an injury, instead of a benefit, as they do not sensibly reduce the surface of the water below them, notwithstanding the immense amount discharged by them upon the parallel back valley. To establish all our premises, therefore, it only remains to be shown that the Mississippi has sufficient capacity below the mouth of Old River, to vent the waters passing within its banks above that mouth, as it receives no further accession below that point.

It is obvious, in the first place, that during the first subsequent flood, when the current shall have attained its high-water velocity, the Mississippi will, at once, remove the bars at the heads of Old River and Plaquemine, as it formerly removed the shoals below the Bonnet Carre crevasse and from the wharves at New Orleans. Having nothing to apprehend from the Red River floods to a full river, the dangers arising from high water, like that of 1828, will be in a great measure avoided, and the necessity of lateral relief to the lower coast will be less urgent. For, if the Mississippi was formerly capable of carrying off all of the waters of Red River, in addition to those of its upper tributaries, without generally endangering the coast, we are certainly justified in concluding that the danger will be less imminent if this source of supply is completely cut off from all connection with that river. What the Mississippi does in one instance, it can do in others. If the sections above Old River are capable of discharging the waters coming down from above, why not the larger sections below that mouth?

Here are the sections of the Mississippi, between banks, in the high water of 1850, which no doubt have inconsiderably changed since, but in no way to impair the force of the argument:

	Square Feet.
Below Memphis half a mile.....	143,212
At the Horseshoe Cut-off.....	161,221
Above the mouth of the Arkansas River three quarters of a mile...	171,190
Below the " " " " " " " "	196,390
At American Bend, upper side.....	170,160
At " " lower side.....	187,170
Terrapin Neck, upper side.....	178,220
" " lower side.....	168,130
Above Vicksburg about seven miles.....	160,164
" " landing half a mile.....	177,200

Below Vicksburg about three miles.....	207,800
Above Palmyra Island Bend.....	187,220
Below " " "	256,292
Above Grand Gulf about four miles.....	175,773
Below " " " three "	264,797
Above the mouth of Old River about half a mile.....	194,530
Below " " " one "	268,646
In the Raccourci Cut-off.....	148,790
At Tunica Bend.....	233,892
At Baton Rouge.....	212,500
Above Plaquemine one and a half miles.....	181,500
Below " " "	199,280
Above Donaldsonville about one mile.....	200,250
Below " " half a mile.....	214,580
Bonnet Carre Bend, above the crevasse (high water of 1849).....	198,734
" " below " " " " "	152,443
Sauve's Plantation, above " " " "	182,031
Which gives us the average area of the same high water section from Memphis to above the mouth of Old River inclusive.....	187,467
The average of the same, from the mouth of Old River down to New Orleans, is	199,331

Or the average section below the mouth of Old River is greater than that of the average section above that point.

Now the general average velocity of the currents of the Mississippi have been found to be very nearly uniform from Memphis to New Orleans, whence it is conclusive that the discharging capacity of the Mississippi, below the mouth of Old River, exceeds the discharging capacity of the river from Memphis down to that mouth; and it is hence evident that no danger is to be apprehended below that point from the closing of the heads of Old River and Bayou Plaquemine.

It is plain, furthermore, that Old River and Bayou Plaquemine together constitute the key to the successful drainage of most all of the country lying west of the Mississippi, and hence, if these two outlets are thoroughly closed, the reclamation of that entire section becomes of easy accomplishment. The plan which I propose is as follows:

1. To hasten the ultimate result by immediately and permanently closing the mouth of Old River, at a point two thousand feet from the mouth, with a substantial and secure dam, with wing levees extending from its extremities to connect with the Mississippi levees both above and below.

2. To deepen and straighten the channel of Bayou Plaquemine from its head to the mouth of Bayou Jacob, a distance of four and a half miles (at which point there is thirteen feet of water), and thus convert it into a slack-water canal for steamboat navigation, with a depth of nine feet throughout.

3. To place a substantial lock in the head of this canal, securely built of brick and erected on a pile foundation, with a combination of cast and

wrought iron gates; chamber to be 280 feet long, with a top width of 80 feet, batter of walls one half inch to the foot, and fully capable of passing the largest steamboat.

4. To remove all of the rafts, snags, and sunken timber, from the Atchafalaya, lower Grand River, the Tensas, etc., thus opening out the net-work of rivers and bayous throughout this region to free navigation in all directions.

It is proposed to make this canal and lock through the Plaquemine, the common highway for the Attakapas and the Red River country, as the distance to the latter, via the Atchafalaya, is about the same as by way of the Mississippi.

Bayou Cut-off, in the parish of Concordia, was carefully examined with a view of making it the communication to the Red River region, by means of a similar slack-water navigation through it, but it was found unsuitable for the purpose in consequence of the extensive batture forming at its Mississippi extremity.

A proper location for such a canal is found a short distance south of Bayou Cut-off (see line *a, b*, on the map D), but it was abandoned on account of the cost of excavation; besides it possesses no advantages over the proposed canal through the Plaquemine. In the margin I give the cost of its construction, however, for future reference and consideration, should the Plaquemine not prove sufficient hereafter for all the commercial wants of an increasing population.

COST OF PLAQUEMINE CANAL AND LOCK.

	Cubic Yards.
Dam across Old River, crown 50 feet, slope of eight to one.....	306,666
Wing levees to connect with Mississippi levees above and below....	66,000
Total cubic yards.....	372,666
Which, at 25 cents, amounts to.....	\$93,166 50
Canaling the bottom of Plaquemine to Bayou Jacob, width 80 feet at top, slopes one to one, with a depth sufficient to give nine feet of water between the low water of the Mississippi and the tide plane at the former point.....	530,000
Which, at 35 cents, amounts to.....	\$185,500 00
Add cost of dam and wing levees as above.....	93,166 50
Total cost of excavation and levees.....	\$278,666 50

The cost of Canal and Lock, on a line between the Mississippi and Red River, a short distance south of Bayou Cut-off, is as follows:

Excavating 1,847,930 cubic yards at 35 cents.....	\$646,775 50
Cost of Lock complete.....	221,333 50

Total cost on this line.....\$868,109 00

COST OF LOCK.

6,890,000 brick, at \$12 per thousand.....	\$ 82,680 00
Laying same in cement at \$8 per thousand.....	55,120 00
6,000 piles, 17 feet long, at \$1 70 each.....	10,200 00
Driving same at \$1 30 each.....	7,800 00
800,000 feet B. M. grillage and lumber at \$20.....	16,000 00
Framing same at 75 cents per square.....	6,000 00
Iron gates and machinery complete.....	12,000 00
Coffer-dam, contingencies, superintendence, etc.....	31,533 50
Total cost of lock.....	\$221,333 50

RECAPITULATION.

Total cost of canaling Plaquemine and diking Old River.....	\$278,666 50
Total cost of Lock complete.....	221,333 50
Appropriation required.....	\$500,000 00

The estimated cost of this plan of operations may seem large at the first special glance, but it will be found in reality to be very economical when we come to investigate the importance and general character of the works themselves, and the many benefits and advantages resulting from their construction. In their general character they are essentially works of drainage and reclamation, and in consequence they should be constructed out of the Swamp Land Fund; for the same amount of money can be expended in no other possible manner to be productive of such vast beneficial results. What is half a million of dollars to the State of Louisiana? or the insignificant cost of these works compared with the great interests at stake, and the general good growing out of their execution? Why the sales of something less than half a million of acres of the swamp lands will more than suffice to construct them perfectly, whereas they will be the direct cause of reclaiming many millions of acres, besides producing other advantages equally desirable to the general prosperity and wealth of the State. These sales are totally unnecessary, however, as there is in the Treasury at present about six hundred thousand dollars to the credit of the Swamp Land Fund, which, if not judiciously appropriated for some extensive work for the general good of the whole State, like the one proposed, will only invite the cupidity of sections, and induce a general scramble for the petty purposes of special legislation.

Let me briefly sum up a few of the general benefits arising from the adoption of this proposed plan:

We secure, in the first place, by its adoption, the great object in view—permanent low water navigation at all seasons to the trade, commerce and products of the Red River, Atchafalaya, and Attakapas, which desideratum we can attain in no other possible way; for it must be distinctly understood

that nothing else can be done to afford permanent low water navigation between the Red and the Atchafalaya and the Mississippi, and also that, from the present condition of things at Old River, we must in addition suffer all the evil consequences of annual inundation on the former, without any corresponding benefit of any kind whatsoever.

The Red River will cut away and remove the deposits at its present mouth, and will flow quietly down the Atchafalaya at an increased velocity and without back waters, preparing the way for the reclamation of all of the low lands upon their borders and upon those of their branches. The high water marks of all these streams will be reduced several feet.

The great net-work of bayous, tensas, and shallow lakes, in and near the mouth of the Atchafalaya, now subject to annual rafting from the drift through the Plaquemine, can all be permanently opened out and rendered navigable in every direction, which in itself will do much for the drainage of that part of the State.

Millions of acres of land, now submerged and unfit for cultivation, on the Red, Black, Ouachita, Tensas and Little Rivers, and their numerous branches, and on the Atchafalaya and in the Attakapas, can immediately be reclaimed and brought under culture, inducing immigration and increasing the wealth and population of Louisiana. New Orleans will continue to be, as now, the great commercial center for the produce of this extensive region, which otherwise she will soon lose.

In short, the interests of no section of the State are threatened by the execution of this project, and it therefore cannot be odious; but, on the contrary, it promotes the interests of almost every section, and consequently commends itself to their united exertions to carry it into execution. It is economical in regard to its original cost, when we examine the benefits resulting from it, and it will require from its permanency but little expenditure to keep it in successful operation.

The time has come to take a broader and more liberal view of the common necessities of Louisiana, and to place her levees and other public works on a firmer basis than heretofore, under the fostering care and protection of the State herself, not leaving them, as now, to the carelessness of individuals or parishes, to drown out the richest and most populous portions of the country. By a proper administration and management of the Swamp Land Fund accruing from the sale of even the balance of the lands still owned by the State, every foot of her territory may be reclaimed and brought under cultivation, and our levees be placed in such a secure condition as to defy anything like the floods hitherto known within the memory of man. Under the State Government the levee system can be thoroughly perfected and tested. As it is, it is not a system, but subject everywhere to the fancy and caprice of individual proprietors and parishes.

Why, look at it. The very fact of closing the mouths of Old River and

Bayou Plaquemine reduces at once the dimensions of all the levees on the Red, Black, Tensas, Ouachita, Little River, Atchafalaya, Courtableau, Fourdoche, Grosse Tete, Grand River, and many others, if, indeed, we do not by these works obviate the necessity of constructing them at all on many of these streams and their branches. This embraces a very large part of the entire State. The problem is of easy solution to thoroughly perfect the levees in the western and southwestern portions of the State and in the Florida parishes. The southern parishes can be reclaimed by the judicious location of a few main drainage canals, after which the leveeing required will be very simple of construction.

The problem is then narrowed down to perfecting the levees upon the Mississippi. This science, skill and intelligence can accomplish, and we then shall have made Louisiana what she ought to be—the richest and most productive agricultural territory of all the cotton-growing States

Fully trusting that the Board will entirely concur in the plan here proposed, and in view of the importance of the subject and the vast general interests involved, see the necessity of strenuously urging its adoption by the next Legislature; and with the hope that foredrawn conclusions and misconceptions, arising from prejudice or lack of due investigation, for or against the closing of the Plaquemine, outlets, and other kindred subjects which have frequently been before the Legislature and the people of the State, may for once be laid aside for the general good of the State at large, I submit this question to that serious attention and calm consideration which its importance demands.

Detailed drawings of the proposed canal and lock are submitted herewith.

STATEMENT OF FUNDS.

Sales of two horses, and one wagon and harness, turned over by	.
L. Hebert, State Engineer.....	\$ 272 50
Expended.....	54 80
	<hr/>
In Bank to credit of Board.....	\$ 217 70
In Treasury, January 1st, 1860, of appropriation of act No. 262	
of 1859.....	\$33,616 15
Warrants drawn on same during the year.....	922 57
	<hr/>
In Treasury, balance available.....	\$32,693 58

RIGOLETS CANAL—PARISH OF JEFFERSON.

Act No. 63, of 1859.—The contract for this canal was made by L. Caldwell, Swamp Land Commissioner of the Second District, with J. H. Harvey, of the parish of Jefferson, at the rate of twenty-three and three-quarter cents per cubic yard; but the work had not been commenced at the time it was turned over to the Board of Public Works.

The length of the canal is 11,000 feet, and it connects the waters of Bayous Rigolets and St. Dennis, thus avoiding the long detour through Little Lake. Its depth is five feet, and its width thirty-five feet, requiring the excavation of 71,296 cubic yards of open prairie, or salt marsh. This, at the contract rates of $23\frac{3}{4}$ cents per cubic yard, amounts to \$16,932 80. As this sum exceeds the amount appropriated, I was directed by the Board to see Mr. Harvey, and endeavor to get him to enter into a written agreement to execute the work for the amount of the appropriation—\$15,000; or otherwise, the Board would be under the imperative necessity of discontinuing the work and annulling the contract, under the provisions of section 18, of act No. 279, of 1859, establishing the Board of Public Works. Accordingly, I visited the site of the proposed canal with Mr. Harvey, and after due deliberation, he entered into the following agreement:

BARATARIA PLANTATION, March 21, 1860.

I hereby stipulate and agree with J. K. Duncan, Chief Engineer, acting for and in behalf of the Board of Public Works, that whereas, the appropriation of fifteen thousand dollars, (\$15,000,) is not sufficient to make the Rigolets and Bayou St. Dennis cut-off, in the parish of Jefferson, under my bid per cubic yard, that I will do all of the work specified in my contract with Lafayette Caldwell, late Second Swamp Land Commissioner, viz.: a canal eleven thousand feet (11,000 feet) in length, thirty-five feet wide, and five feet deep, for the sum appropriated, viz.: fifteen thousand dollars. (\$15,000.)

Signed,

J. H. HARVEY.

Witness, WILLIAM B. BERTHOUD.

Shortly thereafter, Mr. Harvey commenced operations on this canal, with a dredge boat, and he has since satisfactorily completed his contract in every particular. To some extent, this canal will facilitate the drainage of the waters coming through Bayous Rigolets and Pierrot, by affording a direct outlet to Bayou St. Dennis; but its greatest advantage is to shorten the navigation to Barataria Bay by some ten or twelve miles, besides enabling boats to avoid the shallow water in Little Lake.

Statement of Funds.

Amount of appropriation.....	\$15,000
Paid to contractor.....	15,000

MAPS AND PROFILES OF STATE RAILROADS.

Act No. 106, of 1859.—Agreeably to the instructions of the Board, and in accordance with the provisions of the foregoing act, I addressed a circular letter to the Presidents of the several railroads of which the State is a stockholder, requesting them to transmit maps of their respective roads, with the profiles of the surveys of the same, as required by the said act. I regret to state that, up to this date, the law has not been complied with by either of these roads, and that Wm. G. Hewes, Esq., President of the New Orleans, Opelousas and Great Western Railroad, is the only one of those gentlemen who deemed the subject of sufficient importance to reply to the circular. Mr. Hewes stated that plans and profiles of his road would be sent as soon as they could be prepared. As there is no penalty attached to a non-compliance with the act, it will necessarily have to be considered void, until the Legislature deems it expedient to enact something more stringent.

The profiles and levels of these roads are of considerable importance, as a source of reference and comparison, and should, by all means, be filed with the archives of the Engineer's Department of the State.

TECHE LOCK—ST. MARTINSVILLE.

Act No. 123 of 1859.—On the 16th of January, the works in progress for the construction of the Têche Lock were suspended for the following reasons :

1. The site of the lock had not been ceded to the State—the title being still vested in the original proprietors ; which fact might have subjected the State, at any time, to serious loss and delay by injunction.
2. Because no plans nor specifications had been prepared for the lock, the Superintendent having been furnished with verbal instructions only, which were deemed insufficient for a work of the importance and character of this.
3. Because the brick furnished for the construction of the lock were totally unfit for any portion of the structure ; besides, the contracts for other materials required them to be paid for immediately on delivery, after which payments, the balance of the appropriations available, were too small to justify the organization of a force for the further progress of the work.
4. From the questionable propriety of the location of the lock, as boats can at all times go above St. Martinsville, when they can reach that point ; and hence, by the location, a portion of the Têche is improved which needs no such improvement by lockage, at the expense of an increased lift to back the waters sufficiently to reach that part of the bayou where the improvement is necessary.

5. The works were suspended for the reason that neither the spirit nor the letter of the acts relating to this work were complied with. For act No. 97, of 1855, orders a survey of the T  che to be made from Franklin to its junction with the Courtableau, in the parish of St. Landry, with direct reference to so improving this stream as to secure steamboat navigation between those points at the lowest stage of water. The special report of L. Hebert, State Engineer, of February 5th, 1856, gives the result of this survey.

By act No. 215, of 1857, an appropriation was made for the construction of a lock, and its position located at a point near St. Martinsville. This act was based upon the special report before referred to; and it is to be presumed that it fully sets forth the objects to be secured. From the preamble to this act it is apparent that the intention of the Legislature was to secure "a good slack-water navigation of the Bayou T  che, from the Courtableau, in the parish of St. Landry, to Berwick's Bay, near Franklin, passing through four of the principal parishes of the State."

Now, by referring to the special report, and more particularly to the map and profile of the survey on file in this office, we find that the T  che was only surveyed from its junction with Bayou Fusilier, to a short distance below New Iberia. No connection appears to have been made with the water levels of the Courtableau, and, as far as it can be ascertained from his report, no idea of such a connection was entertained by Mr. Brent, Assistant Engineer, who made the survey. Hence, it is evident that the design of the Engineer and the intention of the Legislature are at variance.

But Mr. Brent furthermore reports, that he found it impossible, even with his skiffs, to proceed up the T  che as far as the Fusilier, for lack of water; stating, however, that the season was unprecedentedly dry. From the known character of this stream, and the assurances given in regard to it by many gentlemen perfectly familiar with its habits at all seasons, we may safely state its condition to be very nearly the same in every other year, very wet seasons excepted, as that reported by Mr. Brent in the summer of 1855. In consequence, Mr. Brent reports that he found it impossible to obtain any reliable data upon which to base an estimate of the amount of feed water which could be obtained. In fact, this is the great difficulty in the problem of improving the T  che by lockage; as in the summer, during the very time that our lock is required for low-water navigation, no dependance is to be placed upon the water supply which is to feed our lock, and so facilitate our operations. Without such a source of supply, the lock in contemplation would prove a wretched failure for all the objects of low-water navigation.

The inference to be drawn from Mr. Brent's report is, that no such supply was found in the summer of 1855 as to justify the construction of a lock, without further investigation and surveys than were then made; and as the

habits of this bayou are very similar for every year, the same thing holds good for the present.

The T  che formerly tapped the Courtableau, but this source has been cut off by a dyke across its head at their junction. The small region otherwise drained by the T  che, is too limited to be counted upon with any degree of certainty, except in wet seasons, and our proposed lock must be certain in its operations, and not be made to depend upon extraordinary contingencies.

In view of the foregoing facts, Mr. von Hippel, Assistant Engineer, was directed to connect the previous levels taken with the water levels of the Courtableau, as well as with those of the Atchafalaya River, at the mouth of that bayou. He was also directed to examine the Bayous Portage, Fourdoche and Fourche—branches of the Atchafalaya—with a view of obtaining a supply in that direction ; upon which supply the practicability or impracticability of improving the T  che, by lockage, entirely depends. The report of Mr. von Hippel, which follows herewith, exhibits the following facts:

1. That the Courtableau is not capable of affording the requisite supply during low stages of water, when alone it is necessary ; and secondly, that a supply cannot be had from either of the Bayous Portage, Fourdoche or Fourche, because their water levels are seven feet below that of the T  che ; and hence, if a connecting canal were made, the upper T  che would flow in that direction, instead of receiving a supply.

In view of the foregoing, together with the fact that the T  che has not the requisite amount of water within itself during low stages, I am compelled to pronounce against the practicability of improving this bayou by lockage, as no low water feed supply can be obtained in any direction ; and hence, the construction of a lock would only prove a complete failure.

I would, therefore, recommend the abandonment of this project, and the sale of the material on hand at public auction. Maps and profiles of the several surveys are on file in this office.

Statement of Funds.

Received from L. Hebert, State Engineer.....	\$4,053 14
“ the agents of State Engineer at St. Martinsville. .	1,643 02
“ J. H. Reid, Superintendent.....	25 02
“ sale of worthless brick....	443 75
Total.....	<hr/> \$6,164 93
Expended of same upon vouchers.....	2,745 93
In Bank, to credit of Board.....	<hr/> \$3,419 00
In Treasury and available, January 1, 1860.....	\$7,750 00
Paid to contractors for material.....	6,291 26
Balance in Treasury.....	<hr/> <hr/> \$1,458 74

The following is Mr. von Hippel's report:

ENGINEER'S OFFICE, BOARD OF PUBLIC WORKS, }
Baton Rouge, La., December 26, 1860. }

SIR—In accordance with your order of November 21, 1860, I proceeded to Arnaudville, which is a very small town at the junction of Bayous Têche and Fusilier. I was unable to find any bench mark of the previous survey in the field-notes, or on any map, therefore I established one on the north-eastern corner of the bridge across the Bayou Têche, the position of which is fully shown on the map and profile.

From this point I prosecuted the survey towards the junction of the Courtableau and Atchafalaya, but saw immediately that the whole fall of the country is towards the Atchafalaya. Nevertheless, I continued the work until I reached Bayou Portage, a distance of four and one-half miles from the initial point, and found a fall of seven feet between the water levels. After such a proof, I discontinued the survey in that direction, as it was clearly impossible to obtain a supply of water from this source.

Proceeding, according to my orders, I then made a survey of the Têche, to its junction with the Courtableau, and took levels very carefully throughout its course.

These surveys and levels have developed the fact that it is impossible to obtain any supply from the Courtableau, except during high water.

About a mile from the Courtableau, opposite the mouth of the Bayou Toulouse, there is a high point in the Têche, from which, during the low water season, the current flows in both directions.

Bayou Courtableau, in dry seasons, has not water sufficient for its own requirements.

The accompanying map and profiles will show these facts fully.

Very respectfully, your obedient servant,

M. v. HIPPEL, Assistant Engineer.

J. K. DUNCAN, Esq., Chief Engineer.

COUSHATTA CHUTE—PARISHES OF NATCHITOCHEs AND BIENVILLE.

Act No. 149, of 1859.—This act appropriates eleven thousand dollars for the completion of the works commenced upon Coushatta Chute, and contracted for by T. P. Hotchkiss, Commissioner of the Third Swamp Land District, with Benjamin Ray, of the Parish of Ouachita.

On the 15th of September, these works were accepted and reported complete, according to contract, by Messrs. P. A. Morse, A. W. Baird and

Madison Carrol, Special Inspecting Commissioners, appointed by G. L. DeRussy, Commissioner of the Board of Public Works, who also recommended that the balance of the appropriation be paid to the Contractor; and furthermore, that an additional appropriation of \$3,784 20, be called for by the Board, for the payment of 13,515 cubic yards of excavation which was not covered by the original appropriation.

F. H. Farrar, Assistant Engineer, was sent to inspect and receive this work on the 11th of September, but owing to the want of proper information and data to work upon, in consequence of the failure of the Commissioner of the Third Swamp Land District to turn over to the Board the maps and profile of the works in progress in his district, Mr. Farrar was unable to estimate accurately the amount of work done. He reported the completion of the work in every particular, however, excepting that the earth was not removed ten feet from the ditches as called for by the contract. On these reports accordingly, Mr. Ray was paid the balance of the original appropriation. I shall be able to lay this subject fully before the Board, on the arrival of Mr. Bennett, Assistant Engineer, who has succeeded in obtaining the profile of the work in question, from which the total amount of work can be accurately estimated, when the propriety of the foregoing recommendation of the Special Commissioners in regard to an additional appropriation can be ascertained.

Statement of Funds.

Amount of Appropriation	\$11,000 00
Paid to Contractor	\$10,906 50
Surveys and Inspections	93 50
	\$11,000 00
	Appropriation exhausted.

RED RIVER LEVEES, RIGHT BANK—PARISHES OF RAPIDES AND AVOYELLES.

Act No. 192, of 1859.—By this act twenty-nine thousand dollars is appropriated for the purpose of continuing the levee down the right bank of Red River, from its terminus, on the plantation of Capt. Wilson, in the parish of Rapides, as far as the appropriation proves available.

The contract for this work was made between T. P. Hotchkiss, Commissioner Third Swamp Land District, and Thomas J. Stafford, of Rapides parish, at various rates per cubic yard for the different portions of the same, or for the sum of \$19,500 for the whole levee, which is something over five miles in length.

Mr. Stafford is rapidly pushing forward this work towards a final completion of his contract, and in a satisfactory and workmanlike manner.

Statement of Funds.

Balance in Treasury and available January 1st, 1860.....	\$20,000 00
Paid to Contractor	10,333 40
	<hr/>
Balance in Treasury	\$9,666 60

BONNET CARRE LEVEE—PARISH OF ST. JOHN.

Act No. 203 of 1859.—The contract for this work was made by A. Duplantier, Swamp Land Commissioner of the First District, with Mathew Carr, of Concordia parish, at the rate of thirty-five cents per cubic yard.

After due inspection and measurement, the levee was accepted upon completion, and a final settlement made with the Contractor as follows :

Total contents of the levee, 97,603.84 cubic yards, which	
at 35 cents, amounts to.....	\$34,161 34
Previously paid by the Swamp Land Commissioner	\$21,000 00
Paid by the Board of Public Works.....	13,161 34
	<hr/>
	\$34,161 34

Statement of Funds.

In Treasury and available, January 1st, 1860	\$13,700 00
Paid Mr. Carr, Contractor	13,161 34
	<hr/>
Balance in Treasury....	\$538 66

Agreeably to the petition of certain small planters residing in the neighborhood of this levee, an instrumental examination was made of the levee from the lower line of Mr. Norbert Longue's plantation to the upper line of Messrs. Boligny & Gauncheon. This levee was found in many places not to be high enough by two feet, and its water or river slope throughout its entire length, is very considerably damaged. To build this levee to the height asked for in the petition, will require 34,926 cubic yards of earth which, at 25 cents will cost.....\$8,731 50

Contingencies and Surveys	368 50
	<hr/>
Appropriation required.....	\$9,100 00

TIDE WATER LEVEE—PARISH OF PLAQUEMINES.

Act No. 204, of 1859.—This work was contracted for by A. Duplantier, Commissioner First Swamp Land District, with G. P. Ayer, of the parish of Plaquemines, at the rate of fourteen cents per cubic yard.

The levee was originally laid out to commence at the lower line of Dr. Wilkinson's plantation, and thence to extend in a north-westerly direction for the distance of 15.49 miles, with a base of twelve feet, hight 4.5 feet, and a crown of three feet wide, containing in all 102,234 cubic yards. It was designed as a protection to the back lands of the river plantations, against the overflows of the gulf waters during storms or high tides.

As these plantations extend back to very different depths, and are all provided with side levees, running back perpendicular to the river to embrace the lands under cultivation, the original location of the levee was changed by Messrs. G. P. Ayer, Edmund Martin, and R. A. Wilkinson, Special Commissioners appointed by the foregoing act, and the following was substituted therefor, viz :

Not to make the levee continuous, but to construct it on a broken line, in parallel courses, so as to close the rear gorges between the side levees of all the plantations throughout the contracted distance, the various sections of it being nearer, or more remote from the river according to the depths of the several plantations.

Mr. D. Urquhart enclosed the rear of his plantation with a private levee, at his own expense, and as his place is included in the total distance contracted for, this private levee should be deducted from Mr. Ayer's contract, at the same dimensions and rates, and paid over to Mr. Urquhart. The line across the rear of his plantation is 7,590 feet in length, and consequently the number of cubic yards to be deducted for the same, at contract dimensions, is 9,487.50, which at fourteen cents per cubic yard amounts to \$1,328 25. Mr. Ayer has, in all other respects, faithfully complied with his contract.

Considerable damage was done to this levee by the storm of August last, which rendered it very uneven on top, and caused the greater portion of it to settle one and a half feet below the established grade line.

It will never fulfill the intention of its original design during the prevalence of such storms as the one referred to, as the water from the gulf swept over the levee at that time, at an average depth of about seven and a half feet.

Statement of Funds.

In Treasury and available, January 1st, 1860.....	\$12,554 60
Paid G. P. Ayer, Contractor.....	\$9,620 64
Inspection and Survey	53 11—9,673 75
Balance in Treasury.....	\$2,880 85

BAYOUS CASTOR AND DUGDEMONA—PARISHES OF CATAHOULA, CALDWELL AND WINN.

Joint Resolution No. 22, of 1860.—M. von Hippel, Assistant Engineer, was directed to make the surveys called for in the foregoing act, and his report thereon follows herewith.

The act contemplates the more rapid discharge of the surface waters, by removing the standing and fallen timbers from the channels of the bayous in question. It appears, however, that there is but little or no timber obstructions in these bayous, and hence our attention must be directed to other means of perfecting the drainage of the lands upon their borders.

M. von Hippel's map and report clearly show, however, that the small amount of bottom land to be drained, is very much cut up by the tortuous meanderings of the bayous themselves, and by the salient spurs of the pine ridges which frequently project into the valleys. These valleys do not average three quarters of a mile in width, and it hence would be absurd to course the banks of these bayous with levees, whereas at the same time it is not at all evident that a levee protection is required. All that is requisite to be done, is to provide for the easy discharge of the surface waters from the adjacent hills, which is a subject for the consideration of the planters themselves, and not for the State. Levees would only impede this discharge, instead of assisting it.

The accompanying map fully exhibits the character of the country in a topographical point of view, and it also shows the extent and location of all the swamp lands upon the Castor and Dugdemona.

M. von Hippel's report is as follows :

ENGINEER'S OFFICE, BOARD OF PUBLIC WORKS, }
Baton Rouge, La., November 21, 1860. }

SIR—In accordance with your orders of October 6th, to make a survey of the swamp lands along the Bayous Castor and Dugdemona, in the parishes of Catahoula, Winn and Caldwell, as required by act No. 22, of 1860, and to report as to the best means of reclaiming them, I left Baton Rouge with my party, October 24th, and arrived November the 1st at the mouth of those two bayous, which unite and form Little River. The next day after my arrival, I commenced the survey and found, after two days field-work, that it was impossible to protect these lands against overflow by means of levees, for the following reasons :

The swamp lands are located in a narrow valley, seldom reaching a width of three-quarters of a mile, skirted by unproductive pine hills, and the bayou crossing and re-crossing from one side of the valley to the other, so dividing the land into small parcels. To protect these small parcels, it would be necessary to build a very long levee (as the accompanying map

shows), which would cost more than the land is worth. Furthermore, these small parcels of land would be made still smaller in a great many places, as the levees could not always be located near the water courses to secure permanence.

A second, and the most important reason why levees are out of the question is, that the rain water which runs from the adjacent hills to the bayous would be arrested, and very soon form lagoons behind them. The quantity of water which comes from these hills, I had an opportunity of observing myself, as we had in the night of the 4th of November, a heavy rain of five hours duration, which caused the bayous to rise two feet and eight inches in ten hours. Not finding an outlet all that water would have collected behind the levees.

After making these observations I discontinued the survey and made a reconnoissance of the bottom lands above. I found the characteristics of the valleys remained the same throughout. My opinion, and that of some of the settlers along these bayous, who are interested in the improvement, is that the lands can only be made more valuable by direct drainage into the bayous by canals, which must be done by the land owners themselves, and which will not cost much labor or money. The State can do nothing there, as the object is too small to introduce a system of drainage.

Very respectfully, your ob't ser't,

J. K. DUNCAN,
Chief Engineer, Present.

M. v. HIPPEL,
Assistant Engineer.

COWHEAD BAYOU, DIKE AND CANAL BETWEEN COWHEAD AND MUSCLE BAYOUS—PARISH OF POINTE COUPEE.

Act No. 23, of 1860.—Agreeably to the requirements of this act, I visited the foregoing works and found that the dike across the mouth of Bayou Cowhead had caved in to a considerable extent, partially closing up the mouth of its brick culvert, and damaging the gate at the other end. Under the directions of L. Caldwell, Swamp Land Commissioner of the Second District, this culvert was completely closed in last year.

I would recommend that this culvert be put in working order, and that the dike be repaired, as the high waters from the Atchafalaya will rise through Bayou Cowhead and overflow the lands back of the levees if this is not done. The culvert requires to be lengthened 16 feet at its head, and to have the gate repaired and a tail apron constructed at its mouth to prevent the water from undermining the dike as heretofore.

ESTIMATE FOR SAME.

Embankment, 1,091 cub. yards at 30 cents.....	\$327 30
Repairing culvert, 10,000 brick at \$30 per m.....	300 00
Repairing gate and constructing apron.....	100 00
Contingencies and inspections.....	72 70

Appropriation required.....\$800 00

The entire system of drainage adopted for the left or eastern bank of the Atchafalaya River, is very injudicious and defective, and greatly prejudicial to the interests of that section of the State. The angle of country lying between the Atchafalaya and the Mississippi Rivers is naturally drained by a series of bayous which formerly discharged into the Atchafalaya. Owing to the overflow of the back country by the flood-waters of the Atchafalaya through these bayous, their mouths have all been dammed up and the levees extended around to meet the levees of Old River and the Mississippi. The Couteau, Moreau, Marine, Lake, Anderson's, Latanache, Warden's, and Cowhead Bayous have all been closed in this manner. Culverts were only placed in the dikes across the mouths of the Latanache and Cowhead, but as these had been badly constructed in the first place, without discharging aprons to prevent the falling water from undermining and washing the dikes, they were closed in by the order of Mr. Caldwell to prevent that dangerous action. In consequence, there is no discharge of the surface waters accumulating in these natural drains, except what escapes by transpiration and evaporation. Had culverts been properly constructed in all of these dikes originally, with self-adjusting gates and discharging aprons, all of the standing waters in the bayous would have been carried off by the action of the culverts themselves, as the water fell in the Atchafalaya. This would have been practical, simple, and economical. Instead of this, however, the following plan was adopted to get rid of these surface waters :

This was to open the cross sloughs connecting the several bayous with each other, so that the drainage of the upper portion of the angle between the Atchafalaya and the Mississippi, was thrown into the next lower bayou, and these again combined were thrown successively upon the next, and so on, until the accumulation of water became too great for the single discharging capacity of either of the lower bayous. Instead, therefore, of draining the country in question, these works only cause the overflow of certain portions of it by concentration.

In the foregoing manner it was designed to connect Bayou Moreau with the Latanache, and this latter with Bayou Cowhead through Flat Bayou, again discharging these combined waters from the Cowhead into Muscle Bayou through Boggy and Johnson's Bayous. Beyond this latter point,

these waters are carried forward in a similar manner, generally parallel to the Atchafalaya, through Muscle Bayou to its forks, whence a portion of it is discharged through Sherman's Bayou into the Atchafalaya, while the balance of it passes through Bayou Geronce, and is finally discharged over the flat country bordering upon Bayou Alabama. This is illustrated by the accompanying map.

Great expense was thus incurred for the improper purpose of accumulating all of the drainage and surface waters of these several streams, to the inundation of the parallel back valley of the Atchafalaya in rainy seasons, in consequence of the lack of capacity of the lower bayous to discharge the whole, although amply sufficient for the natural drainage of their own proper sections. This plan was only partially carried out as designed, however, owing to the imperfection of the works themselves. These connecting sloughs are mere coulées without any natural drainage capacity, and little or nothing was done to increase this, excepting to cut down the trees upon their banks and to remove the fallen timber from their channels. Thus Flat Bayou, the connection between the Latanache and Cowhead, is still in a state of nature, full of stumps, logs, and cypress knees. In Boggy Bayou the fallen timber was removed from its channel, but no excavation was made to connect it with Johnson's Bayou. This was necessary, however, as there is a ridge between the two, the latter flowing originally into Muscle Bayou, while the former discharged into Bayou Cowhead. Johnson's and Boggy Bayous together form the canal referred to in the foregoing act, and to enable them to carry off the water from above into Muscle Bayou, a considerable amount of excavation must be made in their channels. A limited amount of labor was expended in deepening Johnson's Bayou, but not sufficient to fulfill the general design of the draining plan. The amount of excavation which should still be done to enable these bayous to perform the work required of them under Mr. Caldwell's plan, is 19,668 cubic yards, which, at 25 cents per cubic yard, amounts to. . . . \$4,917 00
Contingencies and inspections. 183 00

Total required. \$5,100 00

I would not recommend the execution of this work, however, for the reasons before given. The proper plan to draw off the surface water accumulating in these several bayous by drainage, is to place suitable culverts through all the dikes opening into the Atchafalaya through which the water will drain freely as the high waters of the river recede. Whatever else may be done now, we will, nevertheless, have to come to this ultimately. Besides, if Old River is closed according to a previous recommendation in this report, better facilities will be afforded for this drainage, as the rise in the Atchafalaya will not reach its present high

water mark by several feet. Should it be deemed advisable to execute both of these works, however, the appropriation required will be as follows:

Cowhead dike and culvert.....	\$ 800 00
Johnson's Bayou.....	5,100 00
Aggregate.....	<u>\$5,900 00</u>

The first work is absolutely required, and should be constructed as early as practicable.

CAT ISLAND LEVEE—PARISH OF WEST FELICIANA.

Act No. 32, of 1860.—In accordance with the provisions of this act, J. M. Searles, Assistant Engineer, was directed to make the necessary surveys required to determine the character and extent of the repairs called for upon the levees of Cat Island. His estimates for the same, are fully stated in his report which follows; and the maps and profiles on file in this office, exhibit the location of the new levee, together with its slopes and dimensions, and that of the levees to be repaired.

Whether an appropriation be recommended for the construction of these levees, or not, will depend entirely upon the views entertained by the Board upon the subject.

ENGINEER'S OFFICE, BOARD OF PUBLIC WORKS, }
BATON ROUGE, La., May 15th, 1860. }

SIR—Agreeably with your instructions of the 9th ultimo, I repaired to Cat Island, in the parish of West Feliciana, after a few days delay at Baton Rouge, consequent upon obtaining all necessary field equipment, and executed the work contemplated in Joint Resolution, No. 32, of the late General Assembly, and quoted in your letter of instructions.

On learning, from several planters, of the security of the levees above Tunica Island to the Tunica Hills, I began my survey at a short distance above the lower line of Wm. H. Barrow's plantation, and extended it to an intersection with what is known as the Bayou Sara levee. This levee was built under my superintendence, and having noted the necessary work to be done on it, I considered it unnecessary to extend my operations farther.

The levees along the boundaries of Cat Island, with the exception of that bordering on the Bayou Sara Creek, are below high water mark, and are built, generally, of very fine, loose sand. The caving of the river bank, at many places, is encroaching very rapidly on the levee, and I was induced, by this circumstance, to locate an entire new line for the distance of about two (2) miles, as shown on accompanying map.

There will be two main drainage points on the Island, after the levees shall have been rebuilt; one at Hardwick's Ditch, and the other on the Bayou Sara Levee—about one quarter of a mile above the Mississippi River Levee.

At the former place, an embankment was constructed two years ago, and two iron boiler culverts, each two hundred (200) feet in length, and forty-two (42) inches in diameter, were placed at the same point. At the latter place, a gap of five hundred (500) feet was purposely left, for the placing of culverts therein.

The culvert work which was begun at Hardwick's Ditch, was left uncompleted. The doors were never hung on the culverts, and no apron was constructed to receive the discharged water: in consequence of this neglect, the force of the water, in falling from the mouths of the culverts, has a continual tendency to undermine the embankment, and if this is not soon remedied, a complete destruction of the whole embankment will ultimately ensue.

You will notice below, the number of cubic yards of earth required to rebuild the levees, the necessary work to be done on the culverts, and the estimated price of the whole:

Levee Work.

Number of Cubic Yards.	Contract Price.	Estimate.
196,132 97-100.....	22 cents.....	\$43,149 25

Additional Work on Culverts at Hardwick's Ditch.

80 Piles, 1 foot square and 20 feet long, at \$7 20-100.....	\$ 576 00
18,118 feet of sheeting, 2 inches thick, at \$30 per thousand feet,	543 54
Nails, Pile Caps, etc., 10 per cent of the whole amount.....	111 95
Contract price (materials furnished).....	2000 00
	<hr/>
	\$3231 49

One Iron Boiler Culvert, at the gap in the Bayou Sara Levee, 75 feet long and 42 inches diameter.....	\$600 00
Doors and other appurtenances.....	200 00
Hauling of Boiler.....	150 00
	<hr/>
	\$950 00

Total Cost of rebuilding Levees and Culverts.....\$47,330 74

Very respectfully, your ob't. serv't.,

JAMES M. SEARLES,

Captain J. K. DUNCAN,

Assistant Engineer.

Chief Engineer Board of Public Works, Baton Rouge, La.

SURVEYS IN THE PARISH OF VERMILLION.

Joint Resolution, No. 35, of 1860.—This act calls for two surveys to be made in the parish of Vermillion, with a view to its partial drainage, out of the appropriation made to the parish by act No. 138, of 1858.

First. A survey on the line dividing Ranges 2 and 3 East, in township 13 South, Southwestern District of Louisiana.

Second. A survey to determine the manner of draining the country lying North of the Grand Cheniere, and South of the Mermentau River.

M. Bennett, Assistant Engineer, was directed to make the foregoing surveys, relative to the first of which he reports, in substance, as follows :

A straight canal cut upon the dividing line between the townships mentioned in the act, 13,855 feet in length, bottom 15 feet wide, slopes one to one, and containing 15,900 cubic yards, will drain the surface water from an area of country embracing about sixty square miles, and I would, therefore, recommend its execution. Plans, profiles, and estimates of the same are on file in this office.

Estimated Cost.

15,900 cubic yards, at 20 cents per cubic yard	\$3,180 00
Inspections, etc.....	520 00
	\$3,700 00

Relative to the second survey called for, Mr. Bennett regards the reclamation of the country in question as impracticable, owing to the fact that every ordinary tide overflows the banks of the Mermentau River throughout a distance of several miles, and as the back country is still lower than the banks, it is constantly subject to tidal overflow. Extraordinary tides submerge the country to the depth of several feet. It is, therefore, evident that the reclamation of the country in question cannot be effected at any reasonable cost, or at a cost at all proportional to the benefits to be derived.

The following is Mr. Bennett's report thereon :

EVERGREEN, AVOYELLES, LA., December 11th, 1860.

SIR—Pursuant to your instructions of the 29th October last, I proceeded on and about the 24th ult., to the Grand Cheniere Island, for the purpose of examining the marsh between the said Island and the Mermentau River. I have to report that it is utterly impracticable to reclaim any portion of it at present. The banks of the river, from Mermentau Lake to the Island, are about two feet high, and are overflowed at times, by rainwater, about two feet deep. The marsh, east of the river, is still lower: there being two bayous running out of the river in this direction, which, in about six miles, diverge into numerous small bayous, and are, finally, lost, or disappear in the low marsh.

Levees would afford no protection, as the *common* high tides raise the river above, or even with, the top of the bank for several miles above the Island, and the *uncommon* high tides overflow the whole country several feet deep. The latter, however, are not periodical, and probably do not occur oftener than once in forty or fifty years. It is a matter of record on the Grand Cheniere Island, which is about six feet above the surrounding marshes, that in "October, 1833, the west end of the Island was inundated by water from the Gulf; and out of fifty inhabitants, twenty-six were lost." The residents were informed by the Indians, prior to this time, "that the whole country had been overflowed by the Gulf long before, and that many of their people were drowned."

Very respectfully, your obd't servant,

MAUNSEL BENNETT,

Assistant Engineer, B. P. W.

Captain J. K. DUNCAN, Chief Engineer, Baton Rouge, La.

LOUISIANA AND ARKANSAS LEVEE.

Joint Resolution No. 48, of 1860.—In accordance with this resolution, F. H. Farrar, Assistant Engineer, was sent to make a thorough examination of this cross levee, and his report upon the same was laid before the Board at its March meeting.

The total length of the levee is 41,175 feet, or about 7-8 miles, with a base of seven feet to every foot in highth, and a crown equal in width to the highth of the levee. The levee completely severs the lateral connection between the Arkansas and Mississippi Rivers with Bayous Mason and Bartholomew and the Tensas and Boeuf Rivers, by forming a barrier against the former above the head waters of the latter. It consequently protects large portions of the parishes of Carroll, Madison, Tensas, Franklin, Caldwell and Ouachita. The total cost of this levee was \$56,537 68, or \$28,268 84 to each of the States of Louisiana and Arkansas, \$30,000 having been appropriated by each for the joint construction of this work. There is consequently a balance standing to the credit of this work, from the funds provided by both States for its construction, of \$3,462 32, which Mr. Farrar recommended in his report, to be applied to sodding the sandy portion of the levee. This recommendation ought to have been complied with, as a part of the levee is constructed of very sandy soil, and vast interests are dependent upon the security of this work.

The report of the Louisiana Commissioners, Messrs. J. H. Brigham, D.

Newton and J. B. Matthews, together with that of the engineer of the work, W. M. Washburn, Civil Engineer, with detailed statements of expenditures, as made to His Excellency, Gov. Thos. O. Moore, are on file in this office, giving full particulars in regard to the work.

DRAINAGE OF THE GRAND MARAIS—PARISH OF ST. LANDRY.

Act No. 52, of 1860.—According to the Board's instructions, P. H. Thompson, Assistant Engineer, was directed to make the necessary surveys for the drainage of the Grand Marais. This survey determined the best method of draining the Marais to be by cutting a canal to convey the waters to the point towards which they naturally flow, viz : to the salt marsh leading back from the plantation of Octave Dalahoussaye, Esq. The release of the right of way, was peremptorily refused for the shortest and most economical line on which to cut this canal, and in consequence the question of drainage was narrowed down to the improvement of the natural outlet, or Bayou Loisel. After considerable delay, the right of way was ultimately ceded to the State on this line, the cession being made by due Notarial act by the planters interested.

On the 1st of October, the contract for the work was sold, at public auction, after due advertisement, to Thomas Hoey, of Natchez, Miss., for nineteen cents per cubic yard. Mr. Hoey gave the names of Messrs. Pinckard, Steele & Co., of New Orleans, and Mathew Carr, of Concordia parish, as his sureties, but he has since failed to sign the bond of contract.

The proposed canal is to be 30 feet wide at the bottom, with a slope of one to one, requiring the excavation of 75,356 cubic yards, which, at the contract price, will cost \$14,317 64.

In my opinion it is inadvisable to expend so large a sum of money on a work of so little general utility as this, as but a few plantations at best would be benefited by the operation. As I have satisfactory reasons for believing that Mr. Hoey does not intend to sign his contract and give the bond of \$20,000 required, I would therefore recommend, in view of the above, either that the appropriation be applied elsewhere in the parish of St. Mary, or otherwise that it be allowed to revert to the Treasury by limitation.

STATEMENT OF FUNDS.

Amount of appropriation.....	\$20,000 00
Survey expenses.....	531 59
Balance in the Treasury.....	\$19,468 41

HARRISONBURG LEVEE—PARISH OF CATAHOULA.

Act No. 75, of 1860.—This act calls for the necessary surveys to determine the cost of constructing a levee on the right bank of the Ouachita River, from the pine hills at, or near Harrisonburg, to the town of Trinity, at the junction of the Ouachita, Tensas and Little Rivers.

Its object is to reclaim the low country in Catahoula parish bounded by the pine hills, Bayou Saline and the Ouachita, and which is flooded annually, more or less, by the lateral discharges of the high waters of the latter stream.

Agreeably to the provisions of the foregoing act and the Board's instructions, F. H. Farrar, Assistant Engineer, was directed to make the surveys for the location and estimates of this proposed levee. The following is his report and estimates thereon, and the requisite maps and profiles are submitted herewith:

The total cost of this levee on the most favorable line, assuming the grade of its crown to be two feet above the high water of 1850, is, according to Mr. Farrar's estimates	\$167,247 20
Add for contingencies and inspections	1,052 80
	<hr/>
Total appropriation required for the work.....	\$168,300 00

The submersion of the low country in question, results almost exclusively from the back waters of the Mississippi through Old River, which, backing up the Red, Black, Ouachita, Little River and their several branches, causes them to overflow their banks and flood the surrounding country, although fully capable of discharging their legitimate supplies within the banks of their channels. This capacity is of no avail, however, as the back-water referred to, acts as a dam to prevent the flow of the streams in the direction of their courses, and forces the waters to rise and overflow the banks at every low point.

If this accession from the Mississippi were shut off from the lower valleys of these streams, the high water surface of the Ouachita would be reduced from five to six feet, with a consequent reduction of its levees throughout the entire distance affected by the back-water. In fact, it would obviate the necessity of constructing the proposed levee at all, with the exception, perhaps, of diking a few of the lateral bayous; and even these dikes would be less costly from the reduced dimensions required in their construction. To accomplish this, Old River must be closed at its mouth, an operation which I earnestly recommend, and which is more fully discussed in a previous portion of this report, with all its detailed consequences and effects.

By doing so, we save the cost of the levee in contemplation—\$168,300—which is a little over one-third of the entire cost of constructing the pro-

posed works at the mouth of Old River and in the head of Bayou Plaquemine.

This is but a small item of the saving, however, as the Harrisonburg levee is only sixteen and a half miles in length, whereas, both banks of the Ouachita are affected by the back-waters at least as high up as the mouth of Bayou Bartholomew, a distance of over three hundred miles.

Nor is this all. The Red, Black, Tensas, Atchafalaya, and Little Rivers, Bayous Saline, Courtableau, Grosse Tête, and many of their branches, are similarly affected by the back-waters of the Mississippi. On these the proposed works will produce the same beneficial results, reducing the dimensions of the levees, and causing the immediate reclamation of millions of acres of low or swamp land, now subject annually to overflow.

The following is Mr. Farrar's report :

ENGINEER'S OFFICE, BOARD OF PUBLIC WORKS, }
Baton Rouge, December 11th, 1860. }

SIR—In compliance with your instructions, dated October 8th, I made an examination and survey of the swamp lying between Harrisonburg and Trinity, for the purpose of reclaiming the same, as per joint resolution No. 75, approved March 2, 1860.

I subjoin herewith a map and profile, showing the location of the proposed work, with a section and estimate of its cost. In this report I shall confine myself exclusively to the cost of the proposed work, and refer you for further information to my report upon the improvement of the Bayou Saline, in which I have embodied the results of my examination of the scope of country included between the high lands of Catahoula, Catahoula Lake, Ouachita, Black and Red Rivers.

Commencing at the pine hills back of Harrisonburg, and crossing Mayo's Bayou near the residence of Judge Taliafero, the located line follows the south side of the bayou to its junction with the Ouachita. It then follows the river back to the head of Bayou Bushley, skirts down the Bushley three-fifths of a mile and crosses. At the point of crossing, the width of the bayou from bank to bank is seven hundred feet. This spot was selected as giving the best foundation and least depth of water in the channel. The maximum depth at the date of survey was found to be three feet. The bed of the stream is hard, gravelly sand, and the banks of the bayou are light clay. Everywhere else the banks of the bayou contain springs, which would cause continual sloughing and leakage in the levee. The maximum height (including one-eighth settleage) is sixty-five feet. A slope of three to one was adopted, with a crown of twenty feet.

From the crossing of the Bushley the line follows the south side of the bayou to its junction with the Ouachita, and thence down the river, keeping the highest ground, cutting off two low points that overflow annually. At a point five miles from Trinity, the line should leave the river bank and

take a westerly course until it strikes the high cane ridge on Lesley's Lake, half a mile from the river, then following round the outside of the lake a distance of two miles, should strike the river again a short distance above the residence of E. Nalle, Esq. By following this route and throwing out about a thousand acres of low land, a large saving in earthwork can be made, with a slightly increased length of levee. A portion of the ridge around the lake was not overflowed in 1828, and a greater portion is above the overflow of 1850.

Below Mr. Nalle's residence, half a mile, the line leaves the river again, following a high palmetto ridge, and comes out upon the river again one mile above the town of Trinity. From thence to Trinity it follows the river bank. Both of the towns of Trinity and Harrisonburg will necessarily be thrown out, as there is no point where earth could be obtained for the construction of the levee, without hauling such a distance as to double the cost.

The only way in fact, by which they could be leveed, would be by raising the grade of their front streets four or five feet, which would involve the necessity of raising the buildings to correspond. All this, however, can be avoided if a proper plan is pursued.

The following is the estimate of cost, etc., in tabular form, of the entire work, assuming as a necessity a grade line two feet above the flood of 1850:

Length of levee (Harrisonburg to Trinity).....	16½ miles.	
Total cubic yards earth-work, including levee-		
ing of Little River.....	810,736	
Cost per yard.....	20c.	
No. of miles grubbing and clearing.....	10.2	
Cost per mile.....	\$500 00	
Total cost of earth work.....		\$162,147 20
Total cost of grubbing and clearing		5,100 00
Entire cost		\$167,247 20

Provided Mayo's Bayou, Bayou Bushley, Little River and several intervening bayous be leveed, and the balance neglected as unnecessary, for reasons assigned in the report on Bayou Saline, the cost of the work will be as follows:

Bayou Bushley.....	179 833 cubic yards	
Little River	175,000 " "	
All other bayous	169,427 " "	
Sum total	524,260 " "	at 20c. \$104,852 06

The above report, together with the accompanying map and profile, is respectfully submitted.

Very respectfully, your ob't serv't,

F. H. FARRAR,
Assistant Engineer.

Capt. J. K. DUNCAN, Chief Engineer.

BAYOU SALINE—PARISH OF CATAHOULA.

Act No. 181, of 1859.—This act appropriates five thousand dollars for the purpose of removing the obstructions from Bayou Saline, in the parish of Catahoula. Agreeably to the Board's instructions, F. H. Farrar, Assistant Engineer, was sent to make an examination of that stream and to report its condition, and the works necessary for its improvement. His report is transmitted herewith in manuscript, marked "A."

This bayou is obstructed between Lakes Saline and Catahoula, a distance of about ten miles, the obstructions consisting of overhanging trees and low wooded points in the abrupt bends, which require to be cut out and removed to a width of eighty feet. There is but little or no fallen timber in the channel. The appropriation is ample for the removal of these obstructions, as \$500 per mile, is a full estimate of the cost of the foregoing work.

Ten miles at \$500 per mile.....\$5,000 00

Overhanging trees and wooded points, however, are not the only obstructions in this stream, and which indeed are so unimportant a consideration, that they may be thrown out of the question entirely. The great difficulty to the successful navigation of Bayou Saline, or in converting it into a main drainage artery for the reclamation of the flat country lying south of the pine hills in Catahoula parish, arises from essentially different causes. This bayou at one time was evidently the direct continuation of upper Little River, which is formed by the junction of Bayous Castor and Dugdemona. What is now called lower Little River, and which empties into the Ouachita River at Trinity, was then only one of the short lateral branches of the latter, and which assisted in draining the low central swamp lying between the Ouachita and Bayou Saline, or Little River proper. Two or more branches of the Saline also headed in this swamp, and which then, as now, discharged into this bayou at the southern extremity of the parish. From some cause, which I shall not attempt to account for, the channel of Bayou Saline was filled up at the point which now constitutes its head, that is at its present junction with Catahoula Lake.

Now the floods of Bayous Castor and Dugdemona, and Little River, necessarily rise very suddenly, as they all flow through narrow valleys skirted with pine hills with a clayey soil, from which the surface water drains rapidly and rushes down the hills to swell these streams. Owing to the closing of Bayou Saline—their natural outlet—it is evident that these flood waters would be dammed up, and consequently would overflow the surrounding flat country. As this overflow rose in height, it would seek a vent through the branches of the Ouachita and the Saline, which drained the basin which it occupied. This was the sole cause of the formation of Catahoula Lake, and the excavation of the channel of lower Little

River through it. This lake consists simply of a low prairie from two to three miles wide, and about fifteen miles long. It is dry for six months in the year, and covered with grass, at which seasons also, the main water channel through it, is only a few yards in width and some two or three feet in depth. When the floods return, they again overflow the prairie and the surrounding low country, seeking the lateral branches of the low swamp, to vent themselves as before.

The level of the bottom of Bayou Saline, is five feet above the bed of Lake Catahoula; and it is hence evident that this bayou only acts as a waste-wier when the back water rises above that level. It is equally evident, that so long as this condition of things continues, a large extent of flat country in Catahoula parish, will be annually subjected to inundation from the causes stated

I would, therefore, recommend the deepening of the head of Bayou Saline, in order to reduce the levels of its bottom to that of the bed of the lake. This will at once drain Catahoula Lake, and cause the reclamation of many acres of land which cannot be reclaimed economically in any other way.

Estimated Cost.

110,000 cubic yards of excavation which, at 25 cents per cubic yard, amounts to.....	\$27,500 00
Surveys and inspections.....	500 00
	<hr/>
Appropriation required.....	\$28,000 00

The appropriation of \$5,000, made by act No. 181, of 1859, should be re-appropriated for the purposes originally intended, as it will expire by limitation in May, 1861. Maps and profiles are enclosed herewith.

BAYOU CONWAY—PARISHES OF ASCENSION AND ST. JAMES.

Act No. 79, of 1860.—The following report of J. M. Searles, Assistant Engineer, who made the survey of this bayou, is adverse to calling for an appropriation for the purpose of clearing it out, on the grounds that this bayou is already sufficiently free from obstructions for all the drainage purposes contemplated by the provisions of the foregoing act. I have, therefore, to refer his report and estimates to the consideration of the Board, for such recommendations thereon to the Legislature as it may deem advisable:

ENGINEER'S OFFICE, BOARD OF PUBLIC WORKS, }
Baton Rouge, La., May 15, 1860. }

SIR—In compliance with your instructions of the 9th ultimo, I made a chain survey of Bayou Conway, in the parishes of Ascension and St. James, with the view of ascertaining its length and “the probable cost of cleaning it out.”

It is my opinion that this bayou is sufficiently clean to meet all drainage demands; yet, if it should be contracted out, I would advise that the clearing should be begun at the upper line of Gov. Manning's Plantation, in the parish of Ascension, and continued down to the line between this parish and St. James.

The bayou above Gov. Manning's is perfectly clean, having been canaled out. Also, beyond the St. James line, for the distance of one and fifty-eightieths (1 50-80) miles.

Length of Bayou to be Cleaned in the parish of Ascension.

Seven miles, at \$500 per mile.....\$3,500 00

Length of Bayou to be Cleaned in the parish of St. James.

One and fifty-eightieths miles, at \$500 per mile..... 812 50

Total cost of cleaning bayou.....\$4,312 50

Contingencies and surveys..... 187 50

\$4,500 00

The examination of this bayou was continued to a point at which it loses itself in the swamp, and its channel is no longer traceable. All of which is fully illustrated on the accompanying map.

Very respectfully, your obedient servant,

JAMES M. SEARLES, Assistant Engineer.

Capt. J. K. DUNCAN,

Chief Engineer Board of Public Works, Baton Rouge, La.

BAYOUS COOLIE AND BONNE-IDEE—PARISH OF MOREHOUSE.

Joint Resolution No. 104, of 1860.—In regard to the works required upon these bayous, I have respectfully to refer the Board to the following report and estimates of J. M. Searles, Assistant Engineer, who surveyed the same.

From Mr. Searles' report, and the accompanying map, it will be seen that the Bonne-idee has been completely shut off from Bayou Lafourche

by the successive closing of all the lateral bayous, or rather sloughs, which formerly connected them. This has forced the Bonne-idee to discharge into Bœuf River, which it now does freely, with an average fall of 0.8 feet per mile, and which is amply sufficient for all drainage purposes.

Should its lateral sloughs be again reopened into the Lafourche, as implied in the requirements of the foregoing act, the water from the Bonne-idee would overflow, without any corresponding benefit, many of the lands on the Lafourche, which have since been brought into cultivation, in consequence of the construction of the existing levees across the sloughs.

Relative to the proposed improvement of this bayou for the purposes of navigation, it will be observed, from his report, than the Bœuf River, on which the navigation depends, only rises ten feet at the bayou's mouth in extreme floods, while the fall of the bayou is 0.8 feet per mile at the same time. Consequently, under the most favorable circumstances, the back waters from the Bœuf can only extend up the bayou for a distance of twelve and a half miles.

To improve this distance, at Mr. Searles' estimate of \$2,500 per mile, will cost the sum of \$31,250—a large sum to expend for a small sectional benefit, when the country generally will still have to depend mainly on the common roads of the country for the transportation of their supplies and products.

The repairs upon the dyke across the upper slough is the only work which can properly be recommended for the Bonne-idee, at a cost of \$222 22.

In regard to the Coolie, it will be seen that it now empties into Bayou Gallion, a stream which is capable of discharging it together with its own waters; whereas, Deep Bayou, into which the act proposes to drain the Coolie, is itself nothing but a slough, or rather a lake, without any natural outlet. Its former discharge was Bayou Bœuf, but this has been dyked off. The Coolie is a very shallow bayou, filled with obstructions, and requiring to be deepened and cleared, in order to give it sufficient capacity to vent the waters of its swamp valley.

The estimates of Mr. Searles for this work are fully given in his report, and fully illustrated by the accompanying map, which are submitted herewith, for the consideration of the Board :

ENGINEER'S OFFICE, BOARD OF PUBLIC WORKS, }
Baton Rouge, La., November 1, 1860. }

SIR—I have completed the surveys comprehended in your instructions of the 8th ultimo, and hereby report the results of my operations :

I was for some days delayed, on arriving at the Bayou Bonne-idee, in discovering the true intent and meaning of the joint resolution, (No. 104.) The resolution evidences a total want of conception of the geography of the country, and of its land-reclaiming necessities. I would respectfully call your attention to the reading of the joint resolution.

The Bayou Bonne-idée has its source in Horse Shoe Cypress Brake, in township 32 north, range 8 east, and flows circuitously for about seventy miles, until it reaches the Bœuf River. Its waters were formerly divided with Lake Lafourche. Those outlets were closed several years since, by legislative enactment and appropriation, and many thousand acres of land in the Lake Lafourche valley were reclaimed from a periodical overflow.

One of the levees, closing the upper outlet of the Bonne-idée to the Lake Lafourche, is now broken. I have measured the extent of the break, and estimated the cost of reconstructing the work.

The resolution, as you will observe, authorized a survey for the purpose of determining on the practicability of ditching and draining the Bonne-idée to Lake Lafourche. Those outlet-levees were built to turn its waters into Bœuf River, and thereby benefit the lands bordering on the Lafourche. Since the construction of the Arkansas levee, which was built conjointly by the States of Louisiana and Arkansas, the Bonne-idée never rises without its banks. I consulted with several gentlemen residing on or near the Bonne-idée, in reference to the meaning of the "resolution," and they informed me that it was the wish of the people to have the bayou cleaned out for the purpose of navigation. It is desired that it should extend from the Bœuf River, as high up as what is termed the State Road, about thirty-four miles.

The fall of the bayou averages about eight-tenths (8-10) of a foot to the mile. Navigation can only be had during the continuance of extreme high water in Bœuf River. The greatest rise of this stream, at the mouth of the Bayou Bonne-idée, is not over ten (10) feet. This shows that navigation by the back waters of the Bœuf River, would not be practicable, even for half the distance contemplated.

The wagon roads in the parish of Morehouse are generally very good, and the planters living on the Bonne-idée have not a longer distance to haul their cotton to Bœuf River than four or five miles; so that I cannot see the necessity for cleaning out the Bonne-idée, even were it practicable, for navigation purposes.

A traverse of the bayou was made from its mouth to the State road. Below is an estimate for cleaning it out, for the distance of thirty-two (32) miles.

A great benefit might be done the lands bordering on the Bayou Coolie. This stream has its origin in township 21 north, range 6 east, and empties into the Bayou Gallion. The Gallion has been cleared of timber for three or four miles above its junction with the Coolie, and for eight or nine miles below. It has sufficient capacity, when fully cleared, to conduct its waters, as well as those of the Coolie, within its banks, to the low swamps along the Bayou Lafourche. I had an opportunity for examining the general topography of the swamp, and I am disposed to think that if the bayou were

cleared of timber and enlarged, it would reclaim many thousand acres of the fairest land in the parish of Morehouse. There are many sloughs which lie parallel with the Bayou Coolie, throughout the swamp, but these can be easily drained as the lands become settled.

I deem the Gallion the proper receptacle of the waters of the Coolie, as they can be conducted by this channel farther from the lands which admit of cultivation; whereas, if they were thrown into Deep Bayou, (which is but a slough,) it would have the effect of gorging the rain water, and backing it up on places which are now being brought into cultivation.

I can only give below an approximate estimate for clearing out and deepening this bayou.

Mr. Henry Brigham, of Morehouse parish, is now engaged in closing four outlets of the Gallion into the Coolie swamp. As this is a necessary part of the reclamation of the swamp, I would recommend, should an appropriation be made for the clearing out and canaling of Bayou Coolie, that Mr. Brigham be relieved by the State of the individual expense he will incur in the construction of his levees. I have also estimated the dimensions and cost of the work he is doing:

Estimates.

Clearing out the Bonne-idée, parish of Morehouse, to the width of seventy-five (75) feet, for thirty-two (32) miles, at the rate of twenty-five hundred dollars (\$2,500 per mile.....	\$80,000 00
Clearing out the Bayou Coolie, parish of Morehouse, to the width of thirty (30) feet, for fifteen (15) miles, at the rate of one thousand dollars (\$1,000) per mile.....	15,000 00
Canaling of same, four (4) feet deep, ten (10) feet wide, for fifteen (15) miles—117,333 cubic yards, at the rate of twenty cents per cubic yard.....	23,466 00
Cost of levee built by Henry Brigham, across the Gallion sloughs, 3,919 cubic yards, at the rate of 25½ cents per cubic yard.....	999 34

Total cost of work necessary to be done on Bayou Coolie.. \$39,465 34

Reconstructing levee across the upper outlet on the Bayou Bonne-idée:

88,888 cubic yards, at the rate of 25 cents per cubic yard.... \$222 22

Very respectfully, your obedient servant,

JAMES M. SEARLES, Assistant Engineer.

Capt. J. K. DUNCAN,

Chief Engineer Board of Public Works, Baton Rouge, La.

HURRICANE, RED MOUTH, LITTLE CREEK, AND MUDDY BAYOUS— PARISH OF FRANKLIN.

Joint Resolution No. 132, of 1860.—F. H. Farrar, Assistant Engineer, was directed to make the surveys called for in this act, and the following is his report thereon.

These bayous are simply chutes of the Bœuf River, which, leaving the river at certain points, come into it again below, at distances more or less remote. The act proposes to close the upper gorges or heads, to prevent the inundation of the back country ; and the report of Mr. Farrar clearly shows the necessity of these works, and that it should be done immediately.

1. Because a large amount of low land will be reclaimed by closing these heads, which are only subject to overflow from the waters of the Bœuf through them, while at the same time they will act as the natural drains of this same swamp country, when this source of supply is shut off.

2. So long as there is no break in the common levee belonging to the States of Louisiana and Arkansas, Bœuf River is fully capable of venting its flood and drainage waters within its banks, and these bayous therefore are not necessary as a relief to its surplus.

The total amount of levee embankment is 12,275 cubic yards, which at 30 cents.....	\$3,682 50
Contingencies, surveys, and inspections....	517 50

Appropriation required for the works.....	\$4,200 00
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ENGINEER'S OFFICE, BOARD OF PUBLIC WORKS,
Baton Rouge, La., June 1st, 1860. }

SIR—In accordance with your letter of instructions, dated April 9th, 1860, I have completed the survey of Hurricane, Red Mouth, and Muddy Bayous, in the parish of Franklin, and beg leave to submit the following report, estimates and accompanying maps :

HURRICANE BAYOU.

Length of levee.....	218 feet.
Average hight.....	6 "
Number of cubic yards embankment.....	1875.5
Nature of soil.....	sandy loam
Top width.....	12 "
Slopes.....	3 to 1
Shrinkage to be allowed in construction.....	$\frac{1}{8}$

RED MOUTH BAYOU.

Length of levee to be repaired.....	1430 feet.
" of new levee needed.....	1100 "
Average hight (entire levee).....	7.3 "

Number of cubic yards (repairs).....	7257
“ “ (new levee).....	1790
Nature of soil.....	sandy loam
Top width (across the bayou).....	16 feet.
“ (remainder).....	4 “
Slopes.....	3 to 1
Total cubic yards.....	9047

MUDDY BAYOU.

Length of levee.....	900 feet.
Top width (see map).....	varying
Slopes.....	3 to 1
Cubic yards.....	1354.2
Average height.....	3.6 feet.
Nature of the soil.....	sandy loam

LITTLE CREEK

Has no outlet or communication with Bœuf River within Franklin parish.

TOPOGRAPHICAL FEATURES OF THE OUTLETS.

Hurricane Bayou is a small outlet that divides into three bayous about half a mile from the river bank. These in their turn, in a short distance, become scarcely perceptible and merge into a swamp that is a portion of the low lands of Red Mouth Bayou. This bayou acts merely as a supply pipe to the swamp when the river rises above the level of its channel, and in turn supplies the river from the resources of the swamp, when the water level of the river is reduced to its ordinary stage. In low water the channel of the bayou is entirely dry.

Red Mouth Bayou has two outlets, one called Dave's Bayou, the other Red Mouth. They unite about a mile from Bœuf River, and form the Red Mouth proper. In another half mile the bayou loses itself in a wide swamp. This swamp, twelve miles in length and five miles wide in its greatest breadth, lies across the neck of a bend of Bœuf River, fifty miles in length. At the lower end of the swamp Red Mouth Bayou again becomes perceptible and empties into Bœuf River, a short distance below the Bayou Lafourche, on the opposite side, and two and three quarters miles above the mouth of Muddy Bayou. This swamp is flooded annually from one to ten feet deep.

The accompanying cross-section of the outlet of Muddy Bayou, shows an opening capable of passing a much larger quantity of water than ever reaches Muddy Bayou, for this reason: the outlet, after cutting through the high ridge on the river, loses itself in a swamp in a very short distance. On the further side of the swamp (which is only some half mile in breadth) is a high ridge, broken only in one point by a flat, some two hundred yards in breadth, across which the water runs, in times of floods, from six to eighteen inches in depth, and finds its way into Muddy Bayou.

It would be best, however, to place the levee at the point indicated on the map, as by that means the intervening swamp would be reclaimed.

EFFECT OF CLOSING OUTLETS.

Red Mouth Bayou was closed by the Statè, in the fall of 1858, by a levee at its upper mouth. In 1859 the flood in Bœuf River was generally about the same hight as that of the preceeding year, except at Red Mouth, where it was *three* feet higher, and plantations, for miles above and below, were injured by water, that had never been overflowed before. The levee was finally cut by some one, and the river fell three feet in the succeeding twenty-four hours. But important changes have taken place since then. By the completion of the cross-levee in Arkansas from the Mississippi to the high lands, the volume of water that heretofore entered the Bœuf from the Arkansas and Mississippi, has been cut off. As long as that levee presents an unbroken front, the bayous on Bœuf River can be leveed without injury to any one, and a vast amount of land reclaimed. It is difficult for me to say what has been the hight of the floods of the Bœuf River from rains, and its own head waters alone, as they have always been heretofore accompanied and augmented by water from the Mississippi, but I should judge from what data I have been able to collect, that the channel of Bœuf River is amply sufficient to accommodate and carry off all its floods from winter rains, even provided that it should be shut out from the various reservoirs, such as the swamp of Red Mouth, Hurricane, and Muddy Bayous.

As the result of my investigation, I am of opinion that these bayous can be leveed without material damage to adjacent property.

F. H. FARRAR,
Assistant Engineer.

J. K. DUNCAN, Esq., Chief Engineer.

DRAINAGE OF LAKE SARDINE—PARISH OF WEST BATON ROUGE.

Act No. 159, of 1860.—In consequence of the increased servitude occasioned by the unnatural drainage of the water of Lake Sardine into Stumpy Bayou, through the canal made for the drainage of Point Manoir Levee, to the prejudice of the plantations on Stumpy Bayou below, and on Fausse River behind, 1875 lineal feet of this canal were filled up to the levels of the natural surface of the ground, under the provisions of the foregoing

act. A contract for the same was entered into with W. W. Lemmon of the parish of West Baton Rouge, for the sum of \$950 for the whole work, or at the rate of about 15 cents per cubic yard. Mr. Lemmon faithfully complied with the specifications of his contract, and filled the canal in a satisfactory manner.

Point Manoir levee is naturally and well drained by a series of coulées or sloughs, leading from the base of the levee, several of which assemble and form Lake Sardine, which drains naturally and with sufficient fall and capacity into Bayou Clause. The remainder of these sloughs come together and form Stumpy Bayou, which drains naturally into Bayou Poydras. All of these sloughs are distinct and separate, with low cane ridges between them, although for the most part, they only consist of ordinary depressions between these ridges.

Both Stumpy Bayou and Bayou Clause require improvements, in the way of removing the fallen timber and other obstructions from their channels to facilitate their flow, and should additional drainage be deemed requisite for the Point Manoir levee, the means applied should be turned in that direction.

STATEMENT OF FUNDS.

Amount of appropriation.....	\$1,000 00
Paid contractor.....	\$950 00
Surveys and inspections.....	47 00— 997 00
Balance in Treasury.....	\$ 3 00

BONNET CARRE POINT LEVEE—PARISH OF ST. JOHN THE BAPTIST.

Act No. 174, of 1860.—This act appropriates ten thousand dollars for the purpose of paying the balance due on the construction of the Bonnet Carré Point levee, after due inspection by a competent Engineer of the Board of Public Works, as called for by L. Caldwell, Swamp Land Commissioner of the Second District, in his report of 1860. After due examination and inspection, a final settlement was made with Patrick Phelan, the contractor, on the 18th of April.

STATEMENT OF FUNDS.

Amount of appropriation.....	\$10,000 00
Paid to contractor.....	9,960 85
Balance in Treasury.....	\$ 39 15

IMPROVEMENT OF THE SABINE.

Act No. 203, of 1860.—This act appropriates fifteen thousand dollars for the improvement of the Sabine River, provided, however, that the State of Texas appropriates an equal sum for the same purpose. I enclosed a copy of this act in a letter to the Governor of Texas, requesting him to officially inform the Governor of this State, of any action taken by the Legislature of Texas relative to the improvement of the Sabine. His Excellency, Governor Moore, informs me, that no communication regarding this subject has been received from Texas up to this date. In consequence, the appropriation necessarily remains untouched, as the provisions of the act make it imperative, that the State of Texas shall appropriate a like sum for the same objects, before it becomes available.

STATEMENT OF FUNDS.

Amount of appropriation.....	\$15,000 00
In Treasury.....	15,000 00

CUT-OFF AND ISLAND BAYOU LEVEES—CATALOULA PARISH.

Act No. 204, of 1860.—Agreeably to the provisions of this act, an instrumental survey was made of the dikes across the heads of these bayous, based upon which, a contract for the repairs of the same was sold at public auction on the 29th of August, after due advertisement, to Peter Young, of Natchez, Mississippi, for sixteen cents per cubic yard. Messrs. R. B. Jones of Catahoula parish, and S. C. Scott of Concordia parish, were accepted as his securities on a bond of \$2,500. The total number of cubic yards required in the repairs of the old dikes, and in the extension of wing levees, is 11,661, which, at the contract price of sixteen cents per cubic yard, amounts to \$1,865 76. Mr. Young has completed his contract agreeably to the specifications, and the work has been accepted.

STATEMENT OF FUNDS.

Amount of appropriation.....	\$2,500 00
To be paid to contractor.....	\$1,865 76
Balance in Treasury.....	\$2,500 00

DRAINAGE OF THE VALLEY BETWEEN THE LAFOURCHE AND TERREBONNE.

Acts No. 185, of 1859, and No. 212, of 1860.—These acts together appropriate fifty-three thousand two hundred and fifty-one dollars and ninety-four cents, for the purpose of constructing the works necessary to drain and reclaim the swamp and overflowed lands situated between Bayous Lafourche and Terrebonne, in accordance with the plans proposed by J. Gorlinski, Civil Engineer, subject to such modifications as the Board may deem judicious to make to carry out the intent of the Legislature in the premises. P. H. Thomson, Assistant Engineer, was directed to examine and report upon the works planned by Mr. Gorlinski, and to estimate the cost of the same, for the consideration of the Board in making such modifications as it deemed proper.

Mr. Thomson fully endorses the line of canals projected by Mr. Gorlinski, the estimated cost of which he places at \$53,000.

The appropriation is sufficient for these proposed works, but should they be executed, the appropriations made by act No. 185, of 1859, will have to be renewed, as they expire by limitation on the 6th of May, 1861.

The report and estimate of Mr. Thomson is as follows herewith :

STATEMENT OF FUNDS.

Appropriated by act No. 185, of 1859	\$40,000 00
Appropriated by act No. 212, of 1860	13,251 94
<hr/>	
In Treasury	\$53,251 94

ENGINEER'S OFFICE, BOARD OF PUBLIC WORKS, }
Baton Rouge, La., October 31st, 1860. }

SIR—In accordance with that portion of instructions of the Department, dated July 18, 1860, which requires me to “examine the valley between the Lafourche and Terrebonne bayous, and report upon the best means of reclaiming the swamp lands embraced in that basin,” I would respectfully report: 1st, that I fully endorse the line of projected canals, proposed by Jos. Gorlinski, Civil Engineer, in his report to the Commissioner of the Second Swamp Land District, dated Baton Rouge, March 4th, 1859, and do most confidently recommend their construction as the very best means of effecting the desired end. 2nd, I would amend his estimates by adopting those originally proposed by him through the prairies, and taking his last estimate of the cost of cutting through the ridges of Bayou Bleu and Point-au-Chien. Adopting these figures I am enabled to furnish you the following estimate :

Canal from lower end of Lake Long to the head of Grand Bayou Bay, 5 90-100 miles, at \$5,000 per mile.....	\$29,500 00
Excavation through Bayou Blen ridge, 26,400 cubic yards, at 30 cents per yard.....	7,920 00
Canal from lower end of Grand Bayou Bay to Bayou Jean Lacroix, 1 85-100 miles, at \$5,000 per mile.....	9,250 00
Excavation through Point-au-Chien ridge, 14,080 cubic yards, at 30 cents per yard.....	4,224 00
Incidentals, surveys, etc.....	2,106 00
Total cost of works complete.....	\$53,000 00

I amend his estimates in this way, because I conceive that his original ideas as to the size of the canals through the prairies were correct, and secondly, because the above amount is fully sufficient to complete the work.

Very respectfully, your obedient servant,

P. H. THOMSON, Assistant Engineer.

Capt. J. K. DUNCAN, Chief Engineer.

IMPROVEMENT OF BAYOU PIERRE—PARISH OF CADDO.

Act No. 214, of 1860.—This act appropriates eighteen thousand dollars for continuing the works in Bayou Pierre, being a portion of an appropriation made for said works by act No. 168, of 1858. The contract was made by T. P. Hotchkiss, Commissioner Third Swamp Land District, with Thomas Hunter, of the Parish of Natchitoches, with the approval of Wm. F. Fortson and John Jordan, two of the special commissioners named in the latter act. This appropriation was not sufficient to complete the works as originally designed; but as far as it held out, the works were executed according to contract, and the balance of the appropriation was paid over to the contractor, upon the certificate of G. L. DeRussy, Commissioner of the Board of Public Works, who had also been the engineer who formerly planned the improvements in question.

STATEMENT OF FUNDS.

Amount of appropriation.....	\$18,000 00
Paid to contractor.....	18,000 00
Appropriation exhausted.	

SWAMP LANDS IN LAFOURCHE.

Acts No. 150, of 1859, and No. 215, of 1860.—Thirty thousand dollars are appropriated by these acts, for draining the swamp lands in the lower part of the parish of Lafourche, according to the surveys, plans and specifications already made and prepared, subject to such modifications as the

Board may deem judicious to make to carry out the intent of the Legislature in the premises.

P. H. Thomson, Assistant Engineer, was directed to make an examination of the country in question, and to report upon the utility, practicability and cost of the several works projected under the administration of L. Caldwell, Commissioner Second Swamp Land District, for the guidance of the Board in modifying the same if necessary. Mr. Thomson rejects the adoption of all the works under consideration, excepting the two following which recommendation I fully approve :

1st. The completion of the Verret and Chevreuil Canal, to drain the angle of country between Bayou Lafourche and the Mississippi River.

2nd. The construction of a direct canal, 39,600 feet in length, between Lake Salvador and Little Lake, to be cut 60 feet wide and 5 feet deep, through open prairie, for the purpose of reducing the water levels of Lake Salvador, the great interior reservoir of the Lafourche Valley.

Mr. Thomson estimates the cost of these works as follows :

Verret and Chevreuil Canal.....	\$15,644 40
Canal draining Lake Salvador.....	88,000 00
Add for contingencies, surveys and inspection.....	1,975 40

Total amount required for the works.....	\$105,619 80
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STATEMENT OF FUNDS.

Appropriated by act No. 150, of 1859.....	\$20,000 00
Expended for surveys, etc.....	4,380 20

Balance in Treasury.....	\$15,619 80
Appropriated by act No. 215, of 1860.....	10,000 00

Total available and in Treasury.....	\$25,619 80
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Required for the construction of proposed works.....	\$105,619 80
Amount available as above.....	25,619 80

Appropriation required.....	\$80,000 00
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This will also require the renewal of the appropriation made by act No. 150, of 1859, as it soon expires by limitation.

I would furthermore direct the attention of the Board to Mr. Thomson's argument in favor of working a State force and boats upon the canals in contemplation, instead of letting them out by contract. His estimates are larger than is necessary, as a first class dredge-boat can be built for about \$17,000, and the negro expenses, fuel, etc., and contingencies, exceed the amount that is absolutely required for efficient service.

His premises being correct, therefore, the conclusions arrived at are self-evident; and it would be judicious economy to extend the same system to all the canals, levees, and other public works of the State, under some well digested general plan.

The following is Mr. Thomson's report :

ENGINEER'S OFFICE, BOARD OF PUBLIC WORKS, }
Baton Rouge, La., September 24th, 1860. }

SIR—In accordance with the orders of the Department of July 18, 1860, directing me to make "a thorough reconnoissance of the country lying between the Mississippi River and Bayou Lafourche," with a view to develop some general plan for the drainage of that section of the State, I would report that I have fulfilled your instructions, and submit the following conclusions :

The plan adopted during my examination was to commence at the great outlets and proceed to the interior, observing carefully so as to be enabled to determine the points where any obstruction might exist. Then to follow out each main bayou (which drained into the outlets) to their sources, carefully noting their capacity and need of improvement. I cannot more clearly show the results obtained, than by briefly describing the valley, referring at the same time to a large map on file in this office, which was made by Jos. Gorlinski, Civil Engineer. The entire drainage of this valley is carried to the Gulf and Barataria Bay, by four bayous, viz : Dupont, St. Denis, Grand and Cabauage. In these, with the exception of Dupont, no obstruction exists, and their capacity for any service which may be imposed upon them, whether by crevasse or otherwise, is ample. Bayou Dupont is almost entirely closed in its lower portion by an accumulation of drift and growth of grass. All these bayous, with the exception of Dupont, receive their waters from Little Lake, and as the quantity which passes through Bayou Dupont is insignificant, owing to its obstructed condition, we may consider that the drainage of the whole valley is compelled to pass through Little Lake. Little Lake, although very shallow, being in no place more than six feet in depth, is not anywhere less than a mile wide. I cannot believe that there exists the least obstruction to the flow of the waters through it.

Proceeding in my examination, I find that the only streams which empty into Little Lake are Bayous Rigolets and Des Amoureux. Bayou des Amoureux heads up in the prairie between Little Lake and Lake Salvador, and affords an outlet for the drainage of the few plantations on the left bank of the Lafourche below Lockport. It has no connection with the drainage of the upper portion of the valley, and is of no greater capacity than will naturally be required of it, *i. e.*, to effect the reclamation of the back lands contiguous to it upon the Lafourche. It will readily be seen, therefore, and more clearly by reference to the map, that all of the surplus waters, both those of ordinary seasons and those occasioned by crevasses, must find their way into Little Lake by Bayou Rigolet. A careful examination of this bayou, and a reference to reports of various Engineers, developed the following facts :

1. The width of the bayou at its mouth is between five hundred and six hundred feet, with an average depth of three and a half feet.

2. The width at the mouth of Bayou Perro is about six hundred feet, with an average depth of fifteen feet.

3. The total rise during the Bell crevasse, on Little Lake, was five feet and seven inches.

4. The total rise at the mouth of Bayou Perro, as near as can be ascertained, was about eight feet.

5. The distance from Bayou Perro to Little Lake does not exceed one and a half miles.

6. Consequently the fall of high water mark is over two feet between these points.

The banks of the bayou are low, and composed of shells and clay.

Proceeding up Bayou Rigolet to its junction with the Barataria, I found it a beautiful stream, large and unobstructed, with trembling prairie on each side. Through the Barataria, and thence through Bayou Villard to Lake Salvador, no obstructions to a free flow of water exists. The bayous are from four hundred to one thousand feet in width, and have depths varying from ten to twenty feet.

Returning to the mouth of Bayou Perro, and tracing it to Lake Salvador, a distance of about fifteen miles, it is found to be very crooked and much embarrassed by shell bars. The distance from the mouth of Bayou Perro to Lake Salvador, in an air line, is about seven miles. Having thus traced the outlets of Lake Salvador, I shall now consider its tributaries. *This lake is the grand reservoir of the valley.*

Bayou Barataria, from its junction with Bayou Villard to the mouth of Harvey's Canal, is of ample capacity, and has recently been thoroughly cleared of logs, stumps, and overhanging trees, by one of the State boats. I did not extend my examination to the upper portion of this bayou, as no very large section of country was interested.

Next are the two bayous leading from Lake Cataouatchie to Lake Salvador, which afford a vent for the drainage of the Northern portions of the parishes of Jefferson and St. Charles. These bayous are the Segnet and Couba. At present they need no improvement.

On the western shores enter bayous Vacherie and Catahoula, which are small streams extending into the prairies for short distances, and of no consequence except with reference to some proposed canals. I shall recur to these bayous in a subsequent portion of this report.

The principal tributary of Lake Salvador, and the one to which my attention was more particularly directed, is Bayou des Allemands, which enters at the extreme northwest. This fine stream, varying from five hundred to one thousand feet in width, and with an average depth of twelve feet, is the sole outlet for all the surplus waters of that part of the valley north of the

New Orleans, Opelousas and Great Western Railroad. Some three miles below the railroad it widens into what is called Little Lake des Allemands, where its depth does not exceed four feet, with, however, a soft mud bottom. I found this lake somewhat obstructed by the floating prairie sent down from above the bridge after the crevasse; but these obstructions do not seriously interfere with the escape of the water. Proceeding above the bridge to Lake des Allemands, the bayou retains the same general character—a wide, open and beautiful stream.

Lake des Allemands forms the reservoir in which the drainage of the entire valley above it is concentrated previous to its escape by the bayou. This lake is some six miles in diameter, with an average depth of six feet, and is surrounded by swamps. High water mark is about eight feet above its present surface. I would remark, however, that all the lakes and bayous have been unusually low this summer.

Numerous small bayous empty into this lake on its eastern and northern shores. There are also several canals extending from the plantations on the Mississippi River. I know of no public work which it would be desirable to undertake upon these shores. In the southwest, however, we find two very important tributaries, and to these the attention of the Board should be especially directed. They are Bayous Chevreuil and Bœuf. Bayou Chevreuil, at the time of my examination, was so low that my boat could not enter it. It is of service during wet seasons only. Bayou Bœuf, on the contrary, is a fine stream, navigable for steamboats to Lake Bœuf, with which it is connected by a canal constructed under the late swamp land administration. This canal has lowered the waters of Lake Bœuf nearly two feet. Lake Bœuf is the reservoir of the waters draining from the plantations on the Lafourche from Raceland to Thibodeaux, an outlet for which is provided by the construction of this canal.

Some three miles from the mouth of Bayou Bœuf enters Bayou Chigby. This stream is the main reliance for draining all the upper portion of the valley. It is connected at its head with Bayou Chevreuil, from which to Bayou Verret a canal was located by the late Commissioner of the Second Swamp Land District. This canal, intended to cut a ridge which forms a basin of all the lands above, would afford a sufficient outlet, and complete the link now wanting in the through line of drainage.

I have thus briefly endeavored to convey some idea of the channels through which the drainage of the valley must be conducted. It will be seen that I have found but two places that demand immediate attention. These are the ridge between Bayous Verret and Chevreuil and the outlets of Lake Salvador. After noticing the canals to which my attention was called by the instructions of the Department, I will state what I conceive to be the proper means of relieving the valley of its surplus waters. I would again refer to the accompanying map.

1. *Verret and Chevreuil Canal.* This canal, as stated above, is intended to cut a ridge which extends from the Lafourche to the Mississippi, and so tap the basin above. It is a matter of the greatest importance that it should be completed as early as practicable. A contract is in force at the present time for its construction, with Wm. L. Miller, but from some cause nothing has been done since January last. An estimate of its cost, given by Geo. R. Wilson, Civil Engineer, amounts to \$15,644 40. As, however, some work has already been done, I presume this amount should be reduced.

2. *Canal between Bayous Coquille and Vacherie, marked A to B on map.* This canal would undoubtedly be of immense advantage to the few plantations situated south of the Barataria Canal; but being of a purely local character, I cannot recommend such an expenditure of public money while work of, as I conceive, much more extended benefit remain to be accomplished.

3. *Two canals from near the Lafourche, one leading to Bayou Catahoula (C to D), the other to Bayou des Amoureux (a to b).* These canals would accomplish altogether the drainage of three or four small plantations. They are not such works as the State should execute, and deserve no farther attention from the Board of Public Works.

4. *A canal from Lake Salvador to Bayou des Amoureux, E to F on map.* The examination of this canal necessarily opens the discussion of what means should be adopted to assist the escape of the waters of Lake Salvador into Little Lake. It was located with the intention of reducing the level of Lake Salvador at least two feet. The canal is 5 69-100 miles in length from the lake to the head of Bayou des Amoureux; from that point to the mouth of the bayou at Little Lake is at least six miles, making the total distance from Lake Salvador to tide water about eleven and a half miles.

The object sought to be obtained by the construction of this canal is one to which the attention of the Department should be especially directed, as should such a result be obtained as the reduction of the waters of Lake Salvador to the extent of two feet, a very extensive body of public lands (now almost valueless) would immediately be reclaimed, and the plantations on the river and Lafourche be almost entirely relieved. The fact that the drainage of all the greater part of the valley north of the railroad is open and unobstructed to Lake Salvador shows the importance of this work, and how it will affect the lands above. The question is, will this canal, if made, accomplish the end desired?

The total rise of the waters of Lake Salvador during the Bell crevasse was eight feet. The rise on Little Lake was five feet seven inches, showing a fall during high water of two feet and five inches. These were extraordinary circumstances, and I prefer to adopt the fall as given by Jos. Gorlinski, Civil Engineer, in his report of surveys made during low water. He gives a difference between the lakes of about twenty inches. *This fall*

is ample, and settles the question as to whether the drainage can be effected. I cannot, however, recommend the adoption of the line proposed by Mr. Gorlinski for several reasons, to-wit:

1. Because he does not adopt the shortest line between the lakes, and so loses a great portion of the fall.

2. Because he would conduct the waters through Bayou des Amoureux, a very crooked stream, with a bad shell bar at its mouth, which would require expensive dredging.

3. And lastly, because a line can be adopted which obviates all these difficulties.

I propose to construct a canal (on the blue line *X Y*) straight from Lake Salvador to Little Lake, a distance of seven and one-half miles, through an open prairie. This would shorten the distance at least four miles, gaining all the advantages of directness, ease of construction, and increase of descent. The grade of this canal would have a fall of three inches to the mile, and we should thus accomplish the end desired.

I submit a detailed estimate of the cost of this canal, and add some remarks with regard to the comparative advantages of letting such works be executed by contract, and having them done by boats and hands belonging to the State:

ESTIMATE OF CANAL FROM LAKE SALVADOR TO LITTLE LAKE.

Dimensions of canal.....	60 by 5 feet	
Length “	39,600 “	
Contents “	440,000 cubic yards.	
Price per cubic yard.....	20 cents.	
Total cost by contract.....		\$88,000

This would be a close approximation of the cost of the work if constructed by a contractor. I now propose to show that it can be done by the State at a great saving. I estimate for a boat built in Government style, with the most approved machinery :

ESTIMATE OF OUTFIT.

For first class dredge-boat.....	\$ 25,000
For twelve slaves at \$1,500 each.....	18,000
Total cost of outfit.....	<u>\$ 43,000</u>

The dredging machinery of a boat of the size estimated for can remove 1,000 yards per diem. It would therefore require two years to complete the work.

EXPENSES FOR TWO YEARS.

Salaries of Captain and Engineer.....	\$ 4,800
Expenses of negroes.....	2,400
Fuel, oil, tools, etc.....	10,000
Repairs and incidentals.....	5,000
	<hr/>
Total expenses.....	\$ 22,200
	<hr/>
Total primary cost of canal to State.....	\$ 65,200

Which is not quite fifteen cents per cubic yard, if we consider the entire amount as expended; but when we remember that there remain the boat and slaves, and that they could not deteriorate very materially in value in so short a period, it is but fair to make some deduction. Another reason why this boat should be constructed is, that there are no canals now projected in the lower portion of the State that she could not make to as great advantage. These two canals, then, are the only works which I find to be much needed in the valley at present.

Very respectfully, your obedient servant,

P. H. THOMSON,

Assistant Engineer.

To Captain J. K. DUNCAN, Chief Engineer, Present.

The character and strength of the levees surrounding and protecting the angular valley embraced between the Mississippi River and Bayou Lafourche, is shown in the following joint report of Messrs. Searles and Farrar, Assistant Engineers. They also lay down the most insecure points in this cordon of levees, whereat the greatest danger is to be apprehended from crevasses. The necessity for completing the Verret and Chevreuil Canal, in order to drain the upper portion of the valley, is also made evident in this report. The only works required for the interior drainage of the Lafourche and Mississippi Valley at present, however, are those recommended in the foregoing report of P. H. Thomson, Assistant Engineer.

ENGINEER'S OFFICE, }
Baton Rouge, La., Dec. 31st, 1860. }

SIR—In compliance with your instructions, dated May 31st and July 18th, we have completed a survey of the right bank of the Mississippi River from the town of Donaldsonville to Fort Jackson, a distance of 153 miles, and of the left bank of the Bayou Lafourche from Donaldsonville to Lockport, a distance of 56 miles.

Accompanying this report are the maps and profiles showing the topography of those streams, their relative position with the levees along their banks, and the elevation of the banks relative to the flood line of 1859, at

the initial point of the survey in Donaldsonville. We would respectfully urge upon the Department the necessity of adopting, hereafter, mean low tide in the Gulf of Mexico as the plane to which all levels should be referred. It is the point to which all of our drainage tends, and by using it our work can be connected with the hydrographic surveys of the General Government. The reference plane heretofore adopted, (the point between the marble and the granite of one of the towers of the State House,) is an arbitrary standard of no practical use. Not having any opportunity of determining mean low tide, the plane adopted by us in the Lafourche survey was taken 100 feet below the level of the flood line of 1859, at the junction of the Bayou Lafourche with the Mississippi River.

Assuming the elevation of the flood in 1859, at Donaldsonville,	
as.....	feet 100.00
The flood line of 1849.....	" 99.57
" " " 1850.....	" 99.53
Extreme low water of 1853.....	" 72.334

The flood of 1859 was the highest known, and the Summer stage of 1853, the lowest recorded. The difference between extreme high water and the low water of 1853, is then 27.666 feet.

The above data were taken from records and memoranda carefully recorded by Andrew Gingry, Esq., P. M. at Donaldsonville, since 1845.	
From records kept at the St. James Plantation of Mr. Lapice, parish of St. James, 15 6-10 miles below Donaldsonville, the elevation of the water line of 1859 was found to be.....	feet 97.959
The flood line of 1849.....	" 97.500
" " " 1850.....	" 97.460
" " " 1851.....	" 97.533
Low water, Dec. 31st, 1854.....	" 72.721

The rise and fall of the tidal wave from the Gulf of Mexico, noted at the above point, on the 25th November, 1854, was fifteen inches ; on the 31st December, same year, five inches ; same point, at 5 hours 20 min. P. M., July 3d, 1860, was 1.176 feet.

Below the St. James Plantation, much difficulty was encountered in finding accurate records of the different floods, but the plane of descent of the Mississippi River at flood stage, as nearly as can be ascertained, is as follows :

Tables showing the Planes of Descent of the Mississippi River and of its Valley, from Donaldsonville to Fort Jackson ; also Plane of Descent of Bayou Lafourche, from Donaldsonville to Lockport, distances and differences of Level between certain points on those streams :

Mississippi River.

Fall of Mississippi River from head of Bayou Lafourche to the Depot of N. O., O. & G. W. R. R.....	11.344	feet.
Distance.....	80.2	miles.
Average fall per mile.....	1.69	inches.
Fall of Mississippi River from Depot of N. O., O. & G. W. R. R. to Fort Jackson.....	7.741	feet.
Distance.....	72.4	miles.
Average fall per mile.....	1.28	inches.
Entire fall from head of Bayou Lafourche to Fort Jackson	19.085	feet.
Distance.....	152.601	miles.
Average fall per mile.....	1.05	inches.
Fall in surface of land from head of Bayou Lafourche to N. O., O. & G. W. R. R. is.....	10.00	feet.
Distance.....	80.2	miles.
Average fall per mile.....	1.49	inches.
Fall in surface of land from Depot of N. O., O. & G. W. R. R. to Fort Jackson.....	9.6	feet.
Distance.....	72.4	miles.
Average fall per mile.....	1.58	inches.
Entire fall in surface of land from Donaldsonville to Fort Jackson is.....	19.6	feet.
Entire distance.....	152.6	miles.
Average fall per mile.....	1.53	inches.

Bayou Lafourche.

Fall of Bayou Lafourche from Donaldsonville to Lockport	10.00	feet.
Distance.....	56.00	miles.
Average fall per mile.....	2.14	inches.
Fall in surface of land from Donaldsonville to Lockport,	19.00	feet.
Distance.....	56.00	miles.
Average fall per mile.....	4.06	inches.

Distances, (Mississippi River.)

Initial Point at Donaldsonville to Bayou Verret Ridge, on the plantation of A. P. Bertant & Bro.....	9.11	miles.
To Vacherie Ridge Road	26.25	"
To Labat's Store.....	44.05	"
To Bell Crevasse.....	75.68	"
To foot of Canal street.....	80.32	"
To Cut-off Road at English Turn.....	85.53	"
To Grand Cheniere Ridge.....	117.63	"
To Fort Jackson.....	152.60	"

Distances, (Bayou Lafourche.)

Donaldsonville to Paincourtville.....	10.3	miles.
" " Plautonville.....	12.1	"
" " Napoleonville	15.6	"
" " Labadieville.....	24.5	"

Donaldsonville to Thibodeauxville.....	33.0	Miles
“ “ N. O., O. & G. W. R. R.....	37.5	“
“ “ Raceland P. O.....	47.6	“
“ “ Lockport.....	56.0	“
Fall of flood line of 1859 from Donaldsonville to Bayou Verret		
Ridge	1.5	feet.
To Vacherie Ridge Road.....	4.0	“
To Labat's Store.....	7.0	“
To Bell Crevasse.....	10.5	“
To foot of Canal street.....	11.00	feet.
To Cut-off Road at English Turn.....	13.5	“
To Grand Cheniere Ridge.....	16.5	“
To Fort Jackson	19.1	“
Fall of flood line of 1859 from Donaldsonville to Paincourt-		
ville	3.333	“
Donaldsonville to Plautonville.....	4.0	“
“ “ Napoleonville	4.9	“
“ “ Labadieville	6.5	“
“ “ Thibodeauxville.....	7.5	“
“ “ N. O., O. & G. W. R. R.....	8.0	“
“ “ Raceland P. O.....	8.8	“
“ “ Lockport.....	10.00	“

In the course of our survey, we located the following ridges, which run from the Mississippi River back into the interior of the Lafourche Valley. They may be enumerated in order as the Bayou Verret Ridge, Vacherie Ridge, and Grand Chénier. They are distant, respectively, from the Initial Point at Donaldsonville, 9.11 miles, 26.25 miles, and 117.63 miles. The Bayou Verret Ridge commences at the Mississippi River, on the plantation of A. P. Bertant Bros., and extends across to Bayou Lafourche on the plantation of James Vinson, Esq. The Bayou Verret intersects the ridge three and a quarter miles from the Mississippi. It is the principal drainage channel for the scope of country included between the Mississippi and Bayou Lafourche, north of the ridge. It has been partially cleared of obstructions and great relief thus afforded, but heavy rains still flood the entire swamp, extending into the fields for a mile or so on either side, to a depth of from one foot to fifteen inches. Starting from the Mississippi River and running back at a right angle to that stream, the ridge falls ten feet in the first two miles. In the next mile and a quarter ending on the east bank of Bayou Verret, the fall is three and a half feet. One or two other small bayous, of which Bayou Napoleon is the most important, intersect the ridge between the Bayou Verret and the plantations of Bayou Lafourche; they are all tributaries, and ultimately join the Bayou Verret. The bottom of Bayou Napoleon is the lowest spot upon the line, being seventeen feet lower than the road on the Mississippi River at the commencement of the cross line. The ridge between the Bayou Verret and the back of the plantations of Bayou Lafourche, is not elevated more than a foot above the general level of the swamp, and is very narrow—in

many places not more than one hundred feet wide. The distance from the Mississippi River to the edge of the woods on Bertaut & Brother's place, is three miles; width of belt of woodland, from Bertaut's field to Vive's field, is one and seven eighths miles; back of Vive's field to the bank of Bayou Lafourche, five and one-fourth miles. Total length of ridge from Mississippi River to Bayou Lafourche is ten and one-eighth miles. The crevasse water in 1858, from the Bell and Labranche crevasses, covered the ridge through the swamp to a depth of from one to two feet.

The accompanying maps will show the scope of country along the Mississippi River that was exempt from overflow in that year from those crevasses. Whenever it could be obtained, the limit of the crevasse water-line was noted during the survey.

The next ridge, the Vacherie, was surveyed for a distance of three and a half miles from the Mississippi River bank. The fall in the first two miles was 13.3 feet; in the remaining one and a half miles it is only 0.8 feet.

The Grand Cheniere Ridge starts on the plantation of Maunsel White, Esq., and, following a southwestern course, terminates at Bastian Bay. It formed a complete protection for the plantations below it on the Mississippi, from the crevasses of 1858. The fall from the bank of the river to the head of the ridge, a distance of half a mile, is 2.3 feet.

Observations on the locations of the levees along the river were made, and the caving banks were particularly noted.

The system of levees in lower Louisiana, upon the Mississippi, is substantially the same as under the Colonial Governments. As a general rule, the burden of building and keeping in repair the embankments, falls wholly upon the front proprietors. In consequence of the heavy outlay thus to be incurred by them, we find that each proprietor seeks to lessen the expense by building his levee with a view to economy in prime cost; and hence, it is rarely built more than a foot or eighteen inches above the flood line, with side slopes of about two to one, and a crown of from two to four feet. No extra precautions are deemed necessary in the bends, where the full force of the current strikes upon the levee. Their location, too, is generally immediately upon the river bank. In many cases, the water slope of the levee is only a continuation of the natural slope of the bank. Thus exposed, the slightest abrasion beneath the bank causes a sloughing of the soil, and a destructive crevasse is the consequence. No precautions are taken in locating new levees, to obviate salient angles, or to accommodate the location to the general course of the stream, with easy curves.

The bank caves very rapidly at Widow Viala's place, three and a half miles below Donaldsonville. The same is the case at Bertaut Bro.'s, Dr. A. G. Wendahl's, Richard Taylor's, Widow Frilou's, Barataria Canal, Dr. Puisant's, (near the English Turn,) at C. Fazende's plantation, and it may

be laid down as a general rule, wherever the current strikes in a bend of the river. At Bonnet Carre Bend, on the *left* bank of the river, the bank is also caving very rapidly. Already holes are dug out, near the bank, in depth from fifty to sixty feet.

Similar observations were made on the Bayou Lafourche. The banks of the Lafourche are even, of a uniform slope, and, from the small volume of its waters, abrade but very little. The levees along the stream are generally in an excellent condition. The bayou makes no very abrupt turns, and, as a consequence, there are no salient angles, causing eddies and counter currents—the chief cause of the abrasion of the banks of alluvial streams.

The terminal point of the line down the Bayou Lafourche was located at Lockport, it not being deemed necessary by us to extend our operations further, in order to carry out our instructions.

The above report, together with the accompanying maps and profiles, is respectfully submitted.

We have the honor to be your obedient servants,

JAMES M. SEARLES,

F. H. FARRAR, JR.,

Assistant Engineers.

Capt. J. K. DUNCAN, Chief Engineer, Baton Rouge, La.

DRAINAGE OF LAKE PEARL—PARISH OF AVOYELLES.

Act No. 222, of 1860.—The survey for the drainage of Lake Pearl into Bayou des Glaises, under the provisions of the foregoing act, was made by W. H. Osborn, Assistant Engineer.

The total length of the canal required is 7,000 feet, with a bottom width of 18 feet, requiring the excavation of 42,650 cubic yards. After due advertisement the contract for the same was sold at public sale, on the 1st of November, to Messrs. A. D. Coco and J. D. Mayeux, the lowest bidders, at the rate of twenty-four and three-fourth cents per cubic yard. Messrs. J. D. Coco and Martin Rabalais were accepted as sureties in a bond for \$17,000. All of the parties named belong to the parish of Avoyelles.

The contractors are progressing with their work agreeably to the specifications, which, at the contract rates, will amount to \$14,820 87.

STATEMENT OF FUNDS.

Amount of appropriation.....\$17,000 00

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DRAINAGE OF RAPIDES ISLAND—PARISH OF RAPIDES.

Act No. 234, of 1860.—This act appropriates twenty-seven thousand five hundred dollars to complete the work contracted for and in progress for the drainage of Rapides Island, in the parish of Rapides, ordered by act No. 118, of 1858. The contract was made by T. P. Hotchkiss, Commissioner Third Swamp Land District, with Messrs. Holt and Grogan at various rates per cubic yard for the several works, amounting to \$39,993 40 for the whole.

There is great obscurity in regard to all of the works turned over by the Swamp Land Commissioner from this District, for lack of the maps and profiles upon which to base estimates, and for want of due information in regard to the amounts heretofore paid to the contractors. The works are approaching completion, however, and a statement of the amount due on a final settlement will be laid before the Board hereafter.

STATEMENT OF FUNDS.

Amount of appropriation.....	\$27,500 00
Paid to contractors.....	8,154 32
	<hr/>
Balance in Treasury.....	\$19,345 68

SCOPINI'S POINT CUT-OFF—PARISH OF BOSSIER.

Act No. 243, of 1860.—Agreeably to the provisions of this act, a canal and protecting levee were staked out across Scopini's Point, at the most favorable location for receiving the direct discharge of Red River, so as to prevent the flow of too much of its waters down Tones Bayou, a stream which leads from Red River directly in the short concave bend of the loop cut off. Owing to the small appropriation made for this work (\$5,000), together with the fact that a protecting levee was required, and that the length of the canal was necessarily fixed, it was impossible to give it the requisite width and depth necessary to insure its cutting by the action of the water within any reasonable period of time. Its bottom width is twenty-five feet, and its depth is only about ten feet below the high water of 1859. At the same time I summoned a jury of six freeholders, residents of the parish of Bossier, in accordance with Section two of said act, to assess the value of the lands of N. F. Scopini and F. Lattier, through which the cut-off was made to pass. Their award was as follows :

STATE OF LOUISIANA, Parish of Bossier :

We, the jury of experts, summoned by the authority of the said State of Louisiana, to assess the value of the lands belonging to N. F. Scopini and F. Lattier, of the said parish, damaged by making the cut-off provided for by act of Legislature of said State, date, 1860, and No. 243. After being duly sworn to do the same, we do give it as our united opinion, that the lands of the said Scopini and Lattier, at said point, when said cut-off shall have been made, will be damaged to the amount of twenty thousand dollars (\$20,000), of which we award five thousand dollars to said F. Lattier, for damages done to his lands, situated in Scopini's Point, and the balance of fifteen thousand dollars (\$15,000) to the said N. F. Scopini, for damages of dwelling houses, quarters and other buildings, crops and inconveniences in cutting said lands.

This done and signed this 10th day of May, A. D. 1860, in the presence of the following witnesses:

	{	HENRY McFARLAND,
	{	JAMES A. PICKETT,
	{	M. LATTIER,
Jury of Assessment	{	J. L. HODGES,
	{	JAMES H. BROWN,
	{	R. HODGES.

Witnesses:

L. A. WROTNOWSKI,

B. L. LANE.

The oath administered to the jury, and their award as above, were duly placed upon the Judicial Record of the parish of Bossier according to law.

Sealed proposals for the execution of the foregoing works, were invited by public advertisement, and a contract entered into with Wm. A. Merriweather, at twenty-three and three quarter cents per cubic yard, for both canal excavation and levee embankment. This work has been completed according to the specifications and contract.

The distance across the Point, by way of the cut-off, is 1,325 feet, in which distance the fall of the surface of high water is 1.40 feet, or about 5.58 feet per mile. The velocity of the current will consequently be considerable, but from the length of time generally required by all cut-offs to excavate an equal section by the natural action of the water, it is not to be anticipated that the great body of the Red River will be discharged through this cut-off for some time to come. In order to have insured this action, and consequently the objects of the act, the canal should have been made much wider and deeper than the appropriation admitted of. So soon as the section of this canal becomes large enough to receive Red River, however, and even before, there will be an immediate deposition made in the channel of the river, just below its head and just above its mouth, and in the course of a few years thereafter, both of the gorges of the bend cut-

off will be entirely closed to navigation. This is the uniform result in all cut-offs, whether natural or artificial.

Thus the country on the west of Red River, which now communicates with it through Tones Bayou, will be completely cut off from this communication with the river. We might have arrived at this same result more efficiently and expeditiously, by at once closing the head of Tones Bayou with a dike, as the cut-off will ultimately amount to the same thing, not to speak of the cost arising from damages to the land through which it immediately passes, as well as the future damages to be anticipated under the provisions of the 6th section of the act, hereafter to be awarded upon the complaints of proprietors of the lands below.

STATEMENT OF FUNDS.

Amount of appropriation.....	\$5,000 00
Paid contractor.....	\$4,081 43
Surveys, inspections, etc.....	416 53— 4,497 96
Balance in the Treasury.....	\$ 502 04

DIKING MOUTH OF BLACK BAYOU—PARISH OF OUACHITA.

Agreeably to instructions from the Board, the necessary instrumental surveys were made for determining the dimensions of a dike to be constructed across the mouth of Black Bayou, at its junction with Bayou de Sierd, as petitioned for by several of the residents of the parish of Ouachita. The object of this dike is to prevent the high waters of the Ouachita River from backing through Bayou de Sierd, and overflowing the swamp lands behind through Black Bayou. A small portion of this swamp land belongs to the State, and considerable land will be reclaimed by the work.

ESTIMATE OF COST.

Length of dike, 220 feet; crown, 12 feet; slope, 3 to 1; containing 7993.28 cubic yards, which at the rate of 25 cents per cubic yard, amounts to.....	\$1,998 32
Contingencies and surveys.....	201 68
Required for construction.....	\$2,200 00

FUNDS FOR THE IMPROVEMENT OF THE FALLS OF RED RIVER.

The following resolution was passed by the Board at its October session, viz :

Resolved, That the Chief Engineer cause to be made an examination and report of the condition and progress and state of the funds, hitherto applied to the Falls in Red River, under contract authorized by the Legislature.

In compliance with this resolution, I would respectfully submit the following statement :

An appropriation of \$20,000 was made by act No. 152 of 1857, for the improvement of the said Falls, which act furthermore named certain gentlemen as Special Commissioners to constitute a Board for the superintendence of the work, of which Board P. J. Hickman of the parish of Rapides, subsequently became chairman. As I am informed by the Auditor, E. W. Robertson, Esq., Mr. Hickman, as chairman of the Board of Commissioners, drew from the Treasury the whole of the appropriation, for which he has since failed to account in the regular manner, basing his refusal upon the grounds of a claim for salary of three thousand dollars per annum. The matter was placed by the Auditor in the hands of Thomas C. Manning, Esq., of Alexandria, La., with directions to institute legal proceedings, in accordance with the requirements of joint resolution No. 211 of 1860.

Accordingly, I addressed a letter to that gentleman, on the 29th of October, 1860, requesting him to furnish me with the requisite information, and his reply thereto I submit herewith :

ALEXANDRIA, Nov. 2d, 1860.

SIR—Your letter of 29th ult. reached me by last mail. The claim against P. J. Hickman, on account of his receipt of the appropriation made for the work on the Falls, was sent to me by Mr. Robertson, the Auditor, last Summer, while Mr. Hickman was absent. Upon his return, he immediately assured me that his account should be prepared, and the balance in his hands paid over without suit. As the term of our Court approached, and no account was forthcoming, I called again on Mr. Hickman, with the assurance that I should not permit a term of Court to pass, and that this matter must therefore be settled. His account, he said, was not ready. To make the story short, I finally proposed to him to pay me such sum as he was sure would be due the State, leaving a margin for errors, and then to prepare his accounts by the last of November, and pay me the balance then, so that I could settle with the Auditor before the close of the year. I ought to have previously said that he proposed to give me a draft upon his merchants for such sum as he was now to pay, and asked me if I would take it payable in November. Of course he ought to have been ready to pay cash, or to draw at sight ; but I know too well

the difficulty of settling these matters to hesitate. I accepted it, and he gave me his draft for \$12,000, payable as above. You will perceive it is not yet due. He supposed that the account to be furnished me would show a balance of over a thousand dollars more, but a few days ago he informed me that he had paid me too much ; that Maillefert had a claim of \$3,000, which he had entirely forgotten, and which would consume the balance in his hands and more. He wanted me to permit the draft already given to be cancelled, and a smaller sum substituted. I have refused, and shall account to the Auditor in due time therefor. At the same time I shall transmit to Mr. Robertson the account of Hickman, from which you can learn the different items of expenditure, etc.

I have thus answered your inquiries in full, and shall be obliged to you, if you will show this letter to the Auditor as a reciprocal courtesy, since I have delayed making any official report to him until I get the account and the draft is paid.

Very respectfully, etc.,

TH. C. MANNING.

J. K. DUNCAN, Esq., Baton Rouge.

The foregoing, therefore, is all the information which can be obtained regarding the fund in question, until Mr. Manning submits to the Auditor the final account and settlement referred to in his letter.

IMPROVEMENT OF THE FALLS.

I cannot readily see why the rocky obstructions constituting the Falls of Red River, were not removed by blasting or other means, as originally intended ; unless, indeed, that work was arrested through fears of the dangerous consequences to be apprehended from their removal, as set forth in the special report of Geo. W. Morse, State Engineer, of February, 1855, in reply to a resolution of the House of Representatives. In regard to these Falls, Mr. Morse says : " Every impediment of this kind which is in Red River, stops the impetus of the water and prevents its running off so fast, and if they were all removed, all the water would soon run out."

The fallacy of this argument is so transparently absurd, that it hardly needs refutation, and the apprehensions founded upon it are completely groundless and the dangers imaginary. So long as Red River is strictly confined within its banks, it is obvious that all the water flowing through its upper sections, must necessarily be discharged through every given section below ; as its channel may then be regarded as a mere trough, with such an inclination as to cause the water to descend through it, with more or less rapidity in proportion to the degree of inclination. If we now suppose an obstruction or dam to be placed in this river, at any given point,

t is evident that it will cause the water to back up the trough or channel, to a distance directly in proportion to the height of the obstruction and to the inclination of the surface plane of the stream. That the dam cannot arrest the passage of the waters from above, is obvious, for the basin formed by the obstruction backing the water, is exactly similar to a vessel having equal supply and discharge pipes, so that when it is once filled up to the level of the discharge, all further accessions from the supply pipe, must, per force, be discharged through the other, the heads or pressure being the same. It is the same with our river. When the basin becomes filled with water up to the height of the channel obstruction, all of the subsequent supplies from above, neither more nor less, will be discharged over the dam in the same manner. If we now remove this obstruction completely, the back waters alone will pass off more rapidly, while the stream itself will assume its original levels and slope. It is evident that the whole river cannot run off, as this presupposes either one of two impossible things; first, that the basin caused by the dam is of sufficient capacity to retain all of the water supplied by the stream, or, otherwise, that the obstruction is high enough to force the waters over the banks, which of course introduces new elements. Neither of these cases are applicable to Red River, however, and hence the same amount of water which reaches the upper Fall, is discharged over the lower, and we can only regard them as obstructions to navigation in consequence.

The total lift of both Falls together, is 7.75 feet, and as the average inclination of the water surface of the river is given at four and one-quarter inches per mile, these obstructions can only back the water up the stream for about twenty-two miles. As this back water proportionally increases the depth over the bottom above the Falls, the presumption is that the navigation, also, has been improved for the distance of twenty-two miles, on the same principle that a lock increases the depth of a shallow stream. But it must be remembered that Red River is a sedimentary bearing stream, and that the check given to its current by the back water, causes the sediment to be deposited throughout the entire distance of the retardation, so that it is more than probable that the Falls shoal, rather than deepen the waters for some twenty-two miles above them. Upon the removal of the obstructions constituting the Falls, these light alluvial deposits would all be washed out at once, by the increased velocity of the river current.

I would therefore recommend, unhesitatingly, an immediate and complete removal of the Falls; and if other rocky ledges exist above them, throughout the distance influenced by the back waters, they should also be removed in a like manner. By doing so, Red River will become a stream of easy navigation whenever there is water at all, and the chances of high-water overflow will be very much diminished in the upper part of the river, between Shreveport and Alexandria.

If in addition to the removal of the obstructions at the Falls, the works heretofore recommended at the mouth of Old River and at the head of Bayou Plaquemine, be also carried into execution, the Red River country will have constant and direct intercourse with the Mississippi at all seasons, the high-water mark of the river will be reduced several feet, and it will flow quietly within its banks, requiring but very little leveeing near its present mouth to keep it from overflowing at any point throughout its entire course from Shreveport to its junction with the Atchafalaya. An appropriation of \$1,000 should be made to defray the expenses of an accurate survey of these Falls, and of the bottom of the river for fifty or one hundred miles above them, as well as to test the character of the material forming the obstructions throughout, by sounding and boring. On such information we can base a proper estimate of the cost of the proposed improvements, and determine the best method of operating.

GENERAL APPROPRIATION.

The appropriation required for the service of the Department under this head, for the fiscal year ending December 31st, 1861, is as follows:

Salary of Commissioners and Secretary of Board of Public Works.....	\$10,000 00
Salary of Chief and Assistant Engineers.....	11,000 00
Salary of Draughtsman.....	1,800 00
Salary of Captain of Boat*.....	1,200 00
Contingent fund for surveys, salaries of rodmen, chainmen, traveling expenses, advertising, office contingencies, etc.,	20,000 00
Total appropriation required.....	\$44,000 00

The contingent fund called for above, is not extravagant, and is, in fact, rather within the actual wants and necessities of the Department.

The appropriation made for contingencies for the present year (1860), for instance, was only \$5,000, notwithstanding the fact, that twenty-four special surveys were ordered by the Legislature, in different parts of the State, and that sixteen works had to be inspected quarterly; besides the traveling expenses of the Board, the expenses of the surveys and examinations ordered by the same, the advertisement of new contracts, stationery, drawing materials and instruments, surveying instruments, and general contingent and office expenditures, all of which had to be drawn out of this small appropriation, which was inadequate to meet them.

*Should the Internal Improvement Department be re-organized upon the basis heretofore recommended, an additional sum of \$1,200 must be appropriated, as the salary of the Captain of each new boat put in commission.

No work should be ordered by the Legislature without an accurate instrumental survey of the same being previously made, to determine its propriety, its cost, and the best method of executing it. The Department is unable to make such surveys, unless it is furnished with the requisite means to pay for the employees required, their traveling expenses and maintenance, as the Engineers cannot be expected to advance the amount out of their private resources, and await reimbursement, upon sworn vouchers, until the next quarterly meeting of the Board. Even if this could be done, it implies a special appropriation to defray the expenses of each special work ordered; and no foresight, on the part of the Legislature, can anticipate one-half of the surveys and examinations required, under a vigorous administration of the Board for the good of the whole State.

Without such a general contingent fund, furthermore, the Board is powerless to perform the duties required of it by law, under Sections 15 and 17, of act No. 279, of 1859, establishing the Board of Public Works.

SECTION 15. Requires the Board "to form and adopt a general system of internal improvement, leveeing, draining, and reclaiming swamp or overflowed land from inundation, which is now possessed by the State, together with their present value and their probable value after leveeing, draining, and reclaiming are completed; also, the effect any work may have upon the land owned by individuals, and report them fully to the General Assembly on or before the first Monday of each session, together with accurate maps of the same."

SECTION 17. Requires the Board "to lay down such plans for their operations as best to enable them to ascertain the most effectual and safe method of conducting the floods of the Mississippi River to the Gulf of Mexico. They shall examine all natural outlets of the river, and ascertain their effect upon the swamp or overflowed land owned by citizens or the State; their capacity for navigation; also, what improvements can be made to facilitate transit, commerce, or navigation, with careful estimate of the expense of the same. They shall also ascertain if any natural outlet of the Mississippi can be closed without endangering levees already made, or to be made; and recommend to the Legislature all important works and levees for protecting State lands from overflow."

A portion of these prescribed duties the Board has been able to accomplish, even with the limited means placed at its disposal, as two of the main natural outlets of the Mississippi—the Plaquemine and Old River—can be closed with propriety, and the effects of such closing, both upon the Mississippi levees, and upon the reclamation of public and private lands, has been fully shown heretofore in this report. Plans for the drainage of the Lafourche and Terrebonne Valleys, the parish of Catahoula, the Red River country, and other sections, have also been laid down, together with a system of internal improvements.

A great deal still remains to be done, however, and the means for accomplishing it [should be placed at once at the disposal of the Board, and so appropriated that it can be drawn quarterly in advance, in order to facilitate the working of the ordinary current transactions of the Department.

A careful survey of all the streams of the State, and an examination of the drainage requirements of the lakes and swamp lands bordering upon them, together with the works before referred to, will enable the Board to develop and lay down, intelligently, a well-digested plan of general improvement, drainage, and reclamation. The contingent fund called for, together with the survey boat recommended in the report upon internal improvements, will suffice for this, without which, special surveys alone can be made hereafter, out of the means provided for each case by special legislation.

GENERAL REMARKS.

The foregoing report embraces all of the principal transactions of the Department for the current year, which are of any public interest: to which I will only add the following synopsis of the appropriations required for the execution of the several works, based upon the surveys called for under special acts of the Legislature, or under orders from the Board of Public Works:

1. Internal Improvement Department.....	\$229,500 00
2. Plaquemine Lock and closing Old River.....	500,000 00
3. Diking head of Bayou Cowhead, etc.....	5,900 00
4. Cat Island Levees.....	47,330 74
5. Drainage in the parish of Vermillion.....	3,700 00
6. Harrisonburg Levee.....	168,300 00
7. Cleaning and deepening Bayou Saline.....	33,000 00
8. Cleaning Bayou Conway.....	4,500 00
9. Bayous Coolie and Bonne-idee.....	119,687 56
10. Closing heads of Hurricane Bayou, etc.....	4,200 00
11. Drainage of Terrebonne Valley.....	53,000 00
12. Drainage of Lafourche Valley.....	105,619 80
13. Diking Black Bayou	2,200 00
14. Survey of Falls of Red River.....	1,000 00
15. Contingent Appropriation for Surveys, etc.....	20,000 00

I cannot, professionally, recommend the execution of all of the foregoing works, my reasons for which, are given in detail in the special reports upon each work respectively.

Those which I consider of the highest importance, and productive of the greatest general good, are the three following, for which appropriations should be made immediately, even if all the others have to go by default for the present, viz.:

First. Closing Old River and canalling and locking Bayou Plaquemine, for the reason that these works materially simplify the problem for the complete drainage and reclamation of a large portion of the State, and furnish the key to the subsequent drainage of the whole. Besides, fully two-thirds of the State are dependent upon their construction, for a free navigable water communication with the Mississippi and the New Orleans Markets.

Second. Re-organization of the Internal Improvement Department, because, constant work is required upon all the streams of the State to improve their navigation and to facilitate their drainage capacity; and no system of drainage and reclamation can ever approach perfection, without beginning at the outlets, and thence opening out all of the main drainage arteries.

Third. General Contingent Fund, with the view of developing a complete general plan of operations for all the public works of the State, so that we can refer every partial work, which may be made hereafter, to this general plan, and so regulate and adjust it, as to make it meet all subsequent requirements of the whole, and conflict with no other interest.

These works, alone, will give constant and diligent employment to the Board and its corps of Engineers for the coming year, while many other works, lying west of the Mississippi, and now imperatively demanded by the necessities of the case, will be found to be totally unnecessary when the foregoing shall have been fully completed.

I am, gentlemen,

Very respectfully, your ob't serv't,

J. K. DUNCAN, Chief Engineer.

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ANNUAL REPORT OF J. K. DUNCAN, CHIEF ENGINEER.

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" 2.	Improvement of Old River.....	17	Acts Nos. 262 of 1859, 29 and 30 of 1860.
" 3.	Rigolet's and St. Dennis' Canal.....	53	Act No. 63 of 1859.
" 4.	Railroad Maps.....	54	Act No. 106 of 1859.
" 5.	Teche Lock, St. Martinsville.....	54	Act No. 123 of 1859.
" 6.	Coushatta Chute.....	57	Act No. 149 of 1859.
" 7.	Red River Levees, right bank.....	58	Act No. 192 of 1859.
" 8.	Bonnet Carre Levee.....	59	Act No. 203 of 1859.
" 9.	Tide-Water Levee.....	60	Act No. 204 of 1859.
" 10.	Survey of Castor and Dugdemona.....	61	Act No. 22 of 1860.
" 11.	Cowhead and Muscle Bayous.....	62	Act No. 23 of 1860.
" 12.	Cat Island Levees.....	65	Act No. 32 of 1860.
" 13.	Surveys in Vermillion parish.....	67	Act No. 35 of 1860.
" 14.	Arkansas and Louisiana Levee.....	68	Act No. 48 of 1860.
" 15.	Grand Marais.....	69	Act No. 52 of 1860.
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Map . 1



PLAN

OF THE MOUTHS OF

RED & ATCHAFALAYA RIVERS.

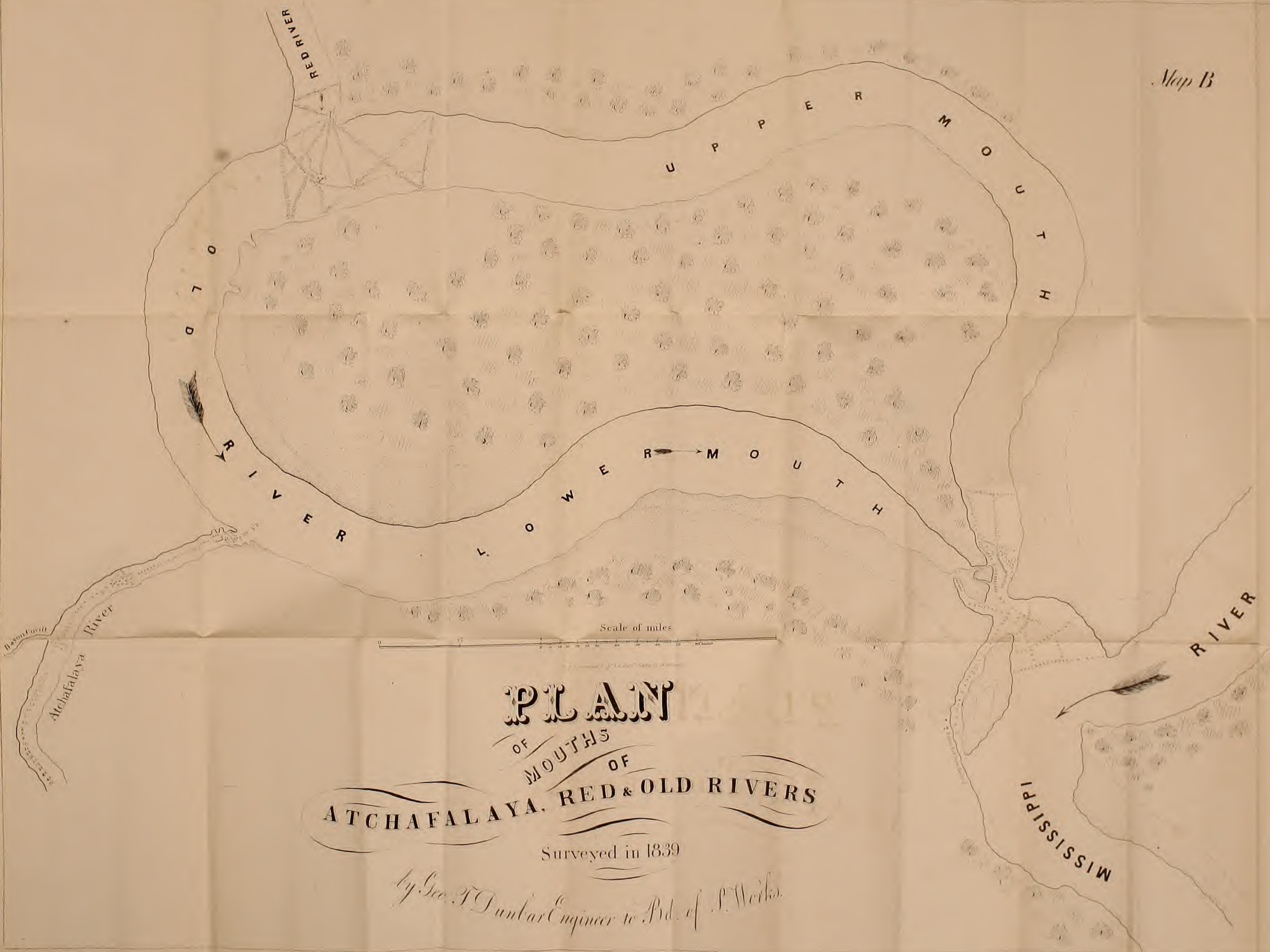
FROM MAP MADE IN 1805

BY R. M. LAFON Civil Engineer.

Scale of Miles

1 mile

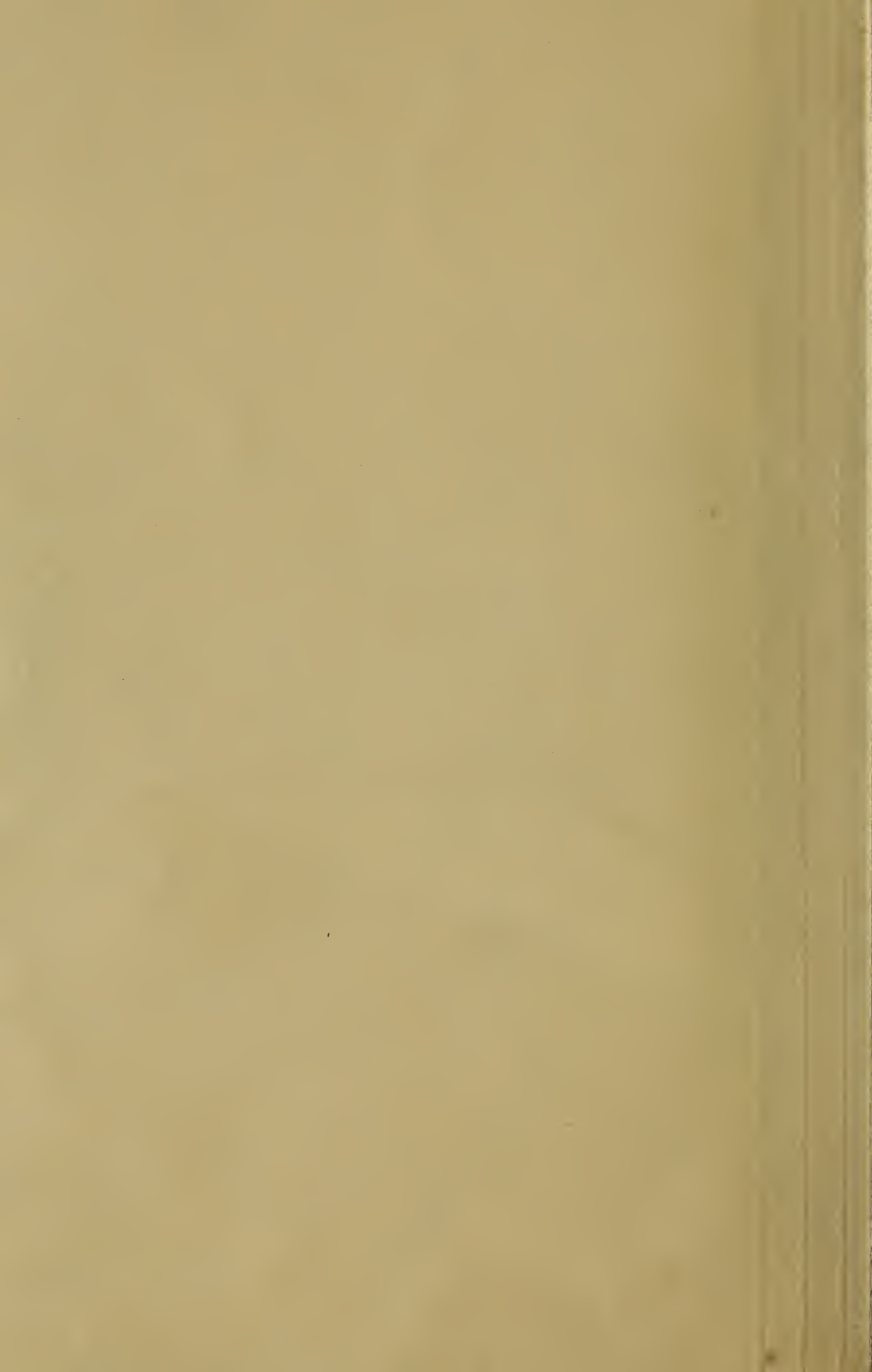
Map B



PLAN
OF
MOUTHS
OF
ATCHAFALAYA, RED & OLD RIVERS

Surveyed in 1839

by Geo. T. Dunbar Engineer to Bd. of S. Works.



Map C



PLAN

OF
MOUTH
OF

ATCHAFALAYA & RED RIVERS.

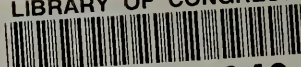
Surveyed in 1854 & 1855

Under the direction of Louis Robert State Eng.

27

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